Model Engineer

DECEMBER 1975

MAP HOBBY MAGAZINE 30p

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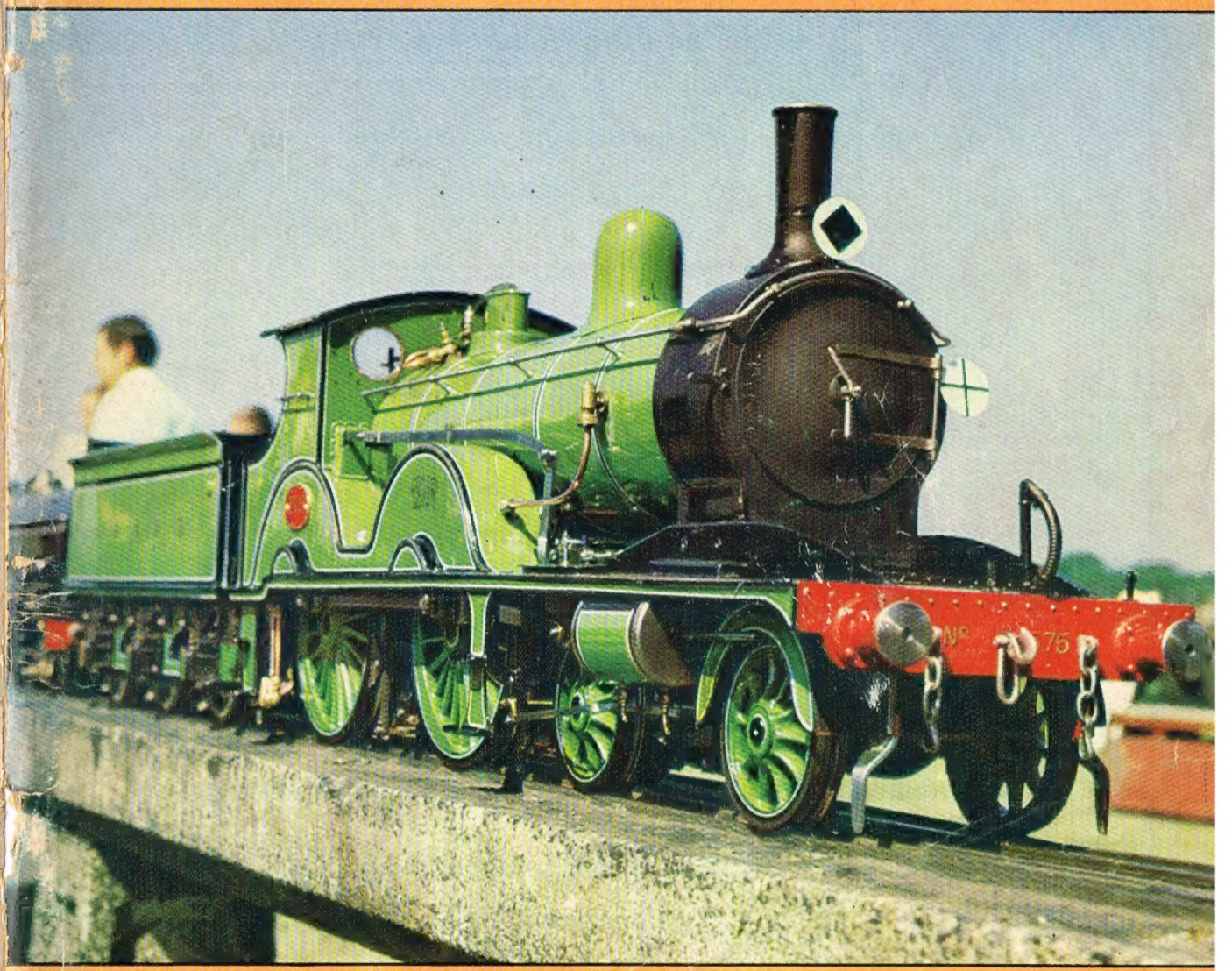

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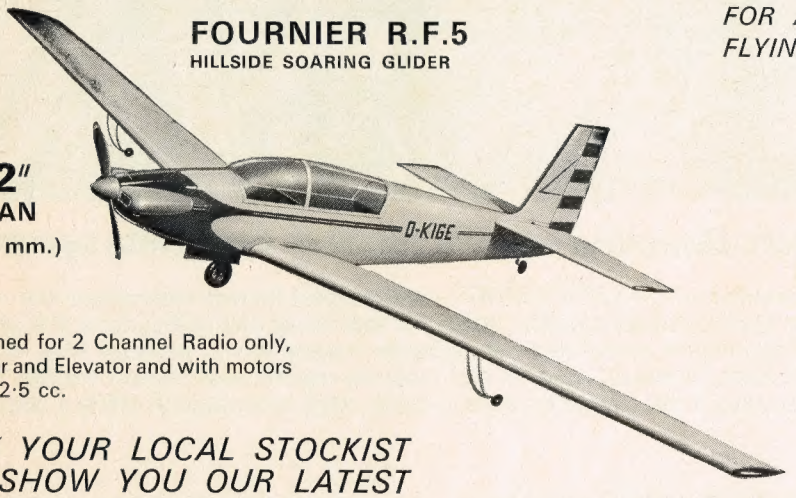

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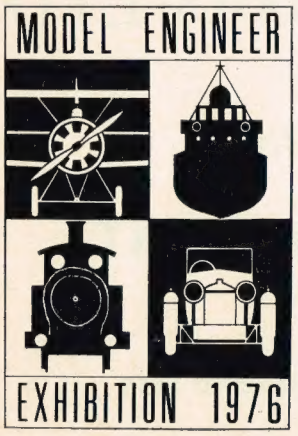

Hours of opening
Daily 10 a.m. - 8 p.m.
(January 10th : 10 a.m. - 7 p.m.)

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On the cover . .

A 5 in. gauge L.S.W.R. 4-4-0 locomotive built by D. W. Horsfall of the Brighouse & Halifax Society, seen at the International Model Locomotive Efficiency Competition, Newcastle last July, where the engine finished in third place. Colour photograph by Ken Swan.

MAP
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MODELMAKING IS SO GOOD FOR YOU!

The therapeutic qualities of model construction always seem to be thrown into sharp focus by national economic gloom. People either want to escape for a time from depressing headlines, or if they are unlucky and on short time, need something satisfying to do in their spare hours. Most crises appear to cause a rush for the workshop, or at least the building board. If times are hard a visit to the scrapyard instead of the foundry, or the choice of a plan rather than an imported kit, offer the opportunity of carrying on at reduced expense but with no diminution of enjoyment—often the reverse, since there is a great sense of achievement in finding successful ways of producing the same result at less cost.

These thoughts are prompted by the amazing amount of interest shown during preparations for the 45th Model Engineer Exhibition. We have a larger competition entry, much more demand for stand space, and many more early enquiries for tickets and party bookings, and all despite the unease engendered by economic prophecies or the savage inflation which has touched all aspects of our lives. Indeed, the costs of organising the Exhibition have increased enormously, but we believe that visitors to it will compare the modest admission charge with that to, say, a cinema, and agree that they have had excellent value for money.

Since the last Exhibition twelve months ago, the other invaluable facet of modelling, internationalism, has been very evident. In Britain, teams from most European countries (and visitors from further afield) enjoyed a superb week of model power boating at the European Championships, held for the first time in this country; at the same time, nine nations competed at Gosport in the first ever international radio-controlled yacht championships. World Championships for two vane yacht classes at Fleetwood had preceded these meetings. In Switzerland, 27 nations were represented in the World Championships for R/C model aircraft, in Bulgaria 31 for free-flight aircraft, and in Belgium 17 at a control-line aircraft international. At some of these functions there were 400 or more competitors and each in its way was a model of how differing nations can get along with each other in the friendliest spirit, despite language barriers and the tensions of competing in a major event.

In the last year, too, we have had serious interest shown by television companies and newspapers, bringing modelling home as a creative and worthwhile pursuit rather than something of limited appeal. It has, in other words, been an eventful and useful year for all model enthusiasts.

At the Exhibition this time we have a very strong entry of locomotives, traction engines, and other engineering-type aspects of construction which demonstrate that skill, patience, ingenuity, and craftsmanship are still very much alive. The other area with a very large entry is in military modelling, a complete contrast to normal model engineering but one equally requiring the four characteristics mentioned. Diorama modelling, perhaps most of all, is an art form, and can be most rewarding; a visit to the balconies

(Continued on page 11)

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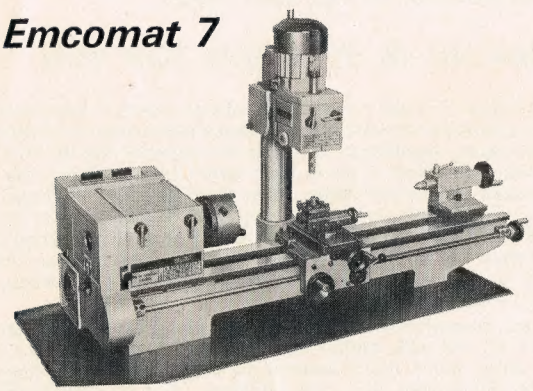

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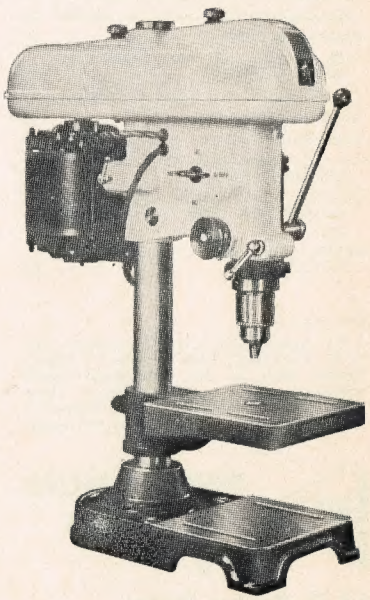

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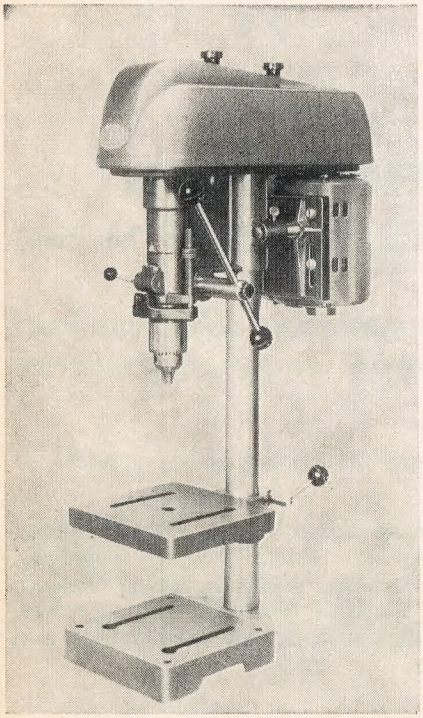

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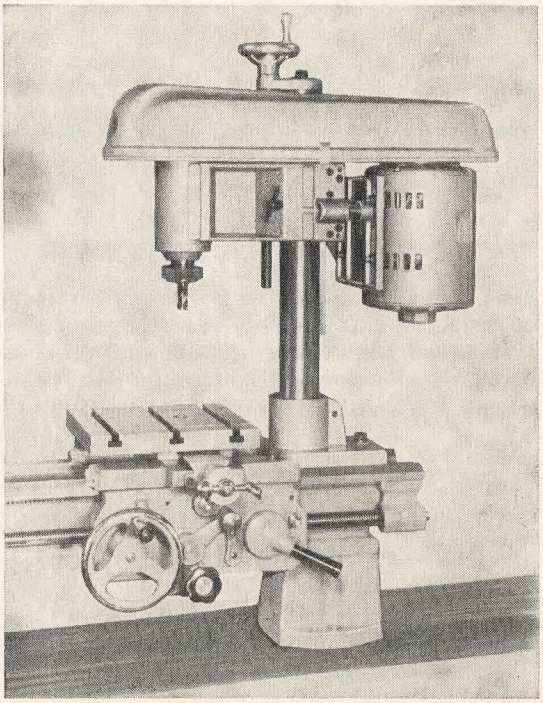

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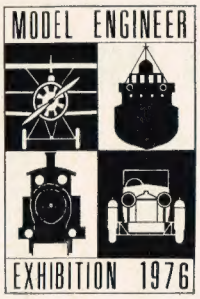


What you will be seeing at the Model Engineer Exhibition

Once again the annual near-miracle has happened and we can open our doors to the public with a fine new display of models greater in number than in previous years, and from their descriptions well up in quality. Some small rearrangements of stand layout will be noticed by our regulars. We have increased circulating space at one or two notorious bottlenecks (adjacent to Messrs. Kennion and Hinchliffe Models respective stands for instance) and brought the flying circle nearer to the entrance to the main hall to provide better viewing upstairs on the balconies. Dire prophecies of updraughts will not we trust be realised, or our pilots will just have to be that much better! Once again Military Modelling and Wargames will be on the balcony. Rather more room around the S.M.E.E. Workshop and display area will, we are sure, be welcomed.

DIORAMAS

Our requirement that dioramas of substantial size must be encased in their own cabinets has increased rather than diminished the entry here, and there will be a splendid display—plus an immense military modelling entry, which in its several classes now approaches a total of four hundred separate entries. These are displayed not only on the balcony but on other sites in good lighting areas of the halls.

FLYING CIRCLE

Year by year our flying circle attracts enthusiasts to try their skills with their own models as welcome as ever! if *you* would like to perform contact our Mr. Peter Richardson at Hemel Hempstead (0442 2501 for attachment particulars) and an enthusiastic crowd of onlookers eager to start work on models for themselves. Indeed, quite a new electric motor and parts industry is springing up in consequence of these displays.

BOATING MARINA

This year international contests in England have focused a lot of public attention on model boating. We hope to be keeping up with the times in providing a number of multi-boat spectaculars. In the main this kind of event must take place in the evenings when clubmen have finished work and such displays will be in the usual capable hands of the Model Power Boat Association. We will be very glad to welcome any boat operators who would like to entertain the public during the daytime hours, to provide variety from our own staff efforts and the trade displays which will also be organised.

LIVE STEAM LOCOMOTIVES

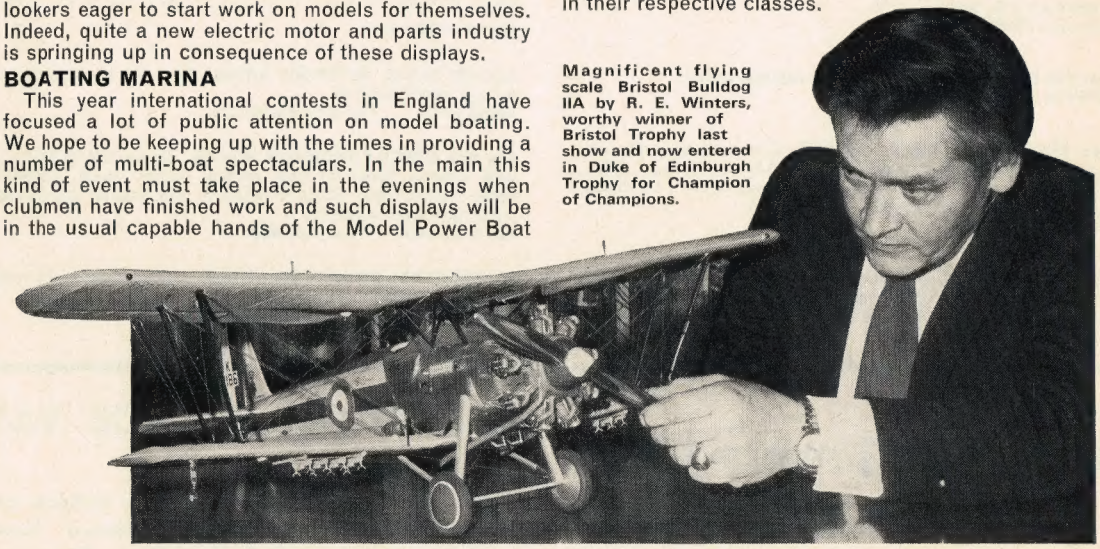
The Society of Model and Experimental Engineers will be providing their team of live steam operators under "Bill" Carter with a splendid selection of beautiful and exciting locomotives on the passenger-hauling track. A noticeboard gives daily steaming details if visitors have a special preference, or stewards will gladly give advance information of unusual or new entries.

S.M.E.E. WORKSHOP & WORKING MODELS

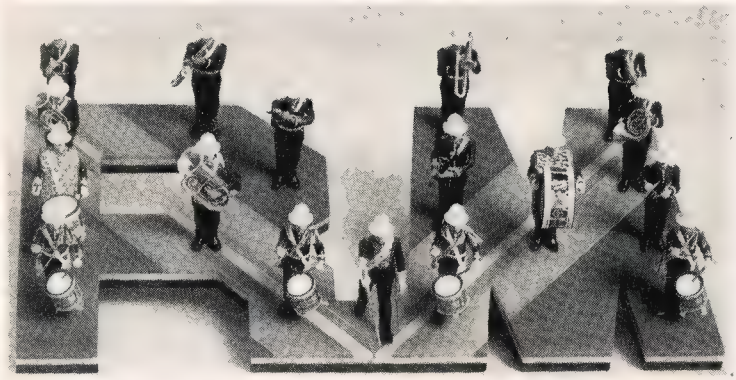
Something that moves is always attractive and S.M.E.E. have always added a touch of compressed air to their model display to keep it nicely animated. The workshop is another feature always on the move! Demonstrators are doing things all the time, yet can still give loads of useful advice to visitors. This year in addition to lathe and milling work demonstrations of brazing will be seen on a nearby stand.

CLUB EXHIBITS

In addition to the S.M.E.E. other clubs or groups have regularly manned stands with models, demonstrations and advice. Now we have a further two unmanned "club collections" on display from the Chingford and St. Albans Clubs. This pinpoints the range of work done in a well supported club—which can well be lost to view where entries are scattered throughout the halls in their respective classes.



Magnificent flying scale Bristol Bulldog IIA by R. E. Winters, worthy winner of Bristol Trophy last show and now entered in Duke of Edinburgh Trophy for Champion of Champions.



Unusual presentation of Royal Marines Band on RM platform in marine colours. It also has a taperecording played live from the band so providing both sight and sound when in its specially built case. Size just over 12 in. long. Built by Duncan Hamilton of Kingston upon Thames.

THE MODELS

Without the models it would be Hamlet without the Prince and a truly great mixture is anticipated. A very strong road vehicle entry comes this year including models from $\frac{3}{4}$ in. to the foot up to 4 in. to the foot if all come as entered. Over two dozen locomotives up to $7\frac{1}{4}$ in. gauge plus several entries for the L.B.S.C. Memorial Trophy. Ship model entries are strong again, whilst tools and horological entries are larger than we can remember.

BOYS' EXHIBITION

Commander Guffick's Boys' Exhibition display will be seen on the balcony as usual. This serves as a pleasant reminder that there must be a start to all modelling activities, and the work of the youngsters, some "first ever", provides an encouraging balance.

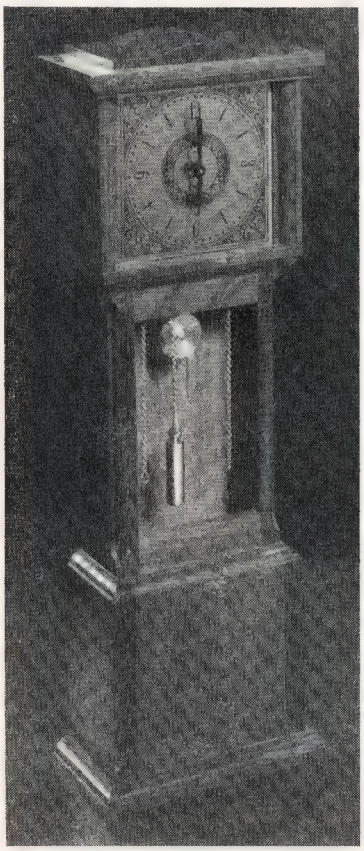
DEMONSTRATIONS

So many visitors come not only to look but to learn that our demonstration stands are always crowded. We have both trade demonstrations such as the Bottle Chopper and our own Gem Craft inspired efforts in enamelling and other craft work—which dare we say it?—offers opportunities for the ladies to get into the act in their own right!

COMMISSIONAIRES

Our commissionaires are there to help in marshalling crowds and maintaining order. Please help by complying with any requests they may make. Our stewards—who will generally be "modelwise" can be distinguished by their orange armbands. To avoid the big crowds midweek visits are more comfortable. Time can be saved by advance ticket booking to save possible Saturday queues.

The biggest aspid — no! — ship in bottle model in the world! Mayflower, 12 in. l.o.a. is car-rack rigged with some 3,000 separate knots. By Leonard Fillery of Ashford, Kent. (Photo: Courtesy Kentish Express).



Miniature Grandfather clock 17¾ in. high with simple spring driven mechanism. Case style is plain and in a modern idiom. By Waugh Morrel of Sunderland.

MODELMAKING IS SO GOOD FOR YOU! *(from page 5)*

will show just how far techniques have advanced in the three or four years since this form of modelling became popular.

There is so much else, from the ever-popular Society of Model & Experimental Engineers' live steam track to demonstrations of painting, that we can only ask our readers to study this Christmas Extra/Souvenir Handbook, whose purpose is to guide actual and potential visitors round the Exhibition. As a special issue, it is also intended to show newcomers just what model construction is all about and to keep exponents of one form of modelling in touch with what their colleagues in other branches are achieving.

Our gratitude is expressed to our readers and friends whose show this is. Much work goes in before and during the Exhibition, and it is truly appreciated, not only by the organisers but by the thousands of visitors who come to see and admire their work, to ask questions, and to stock up with the products offered by the trade stands.

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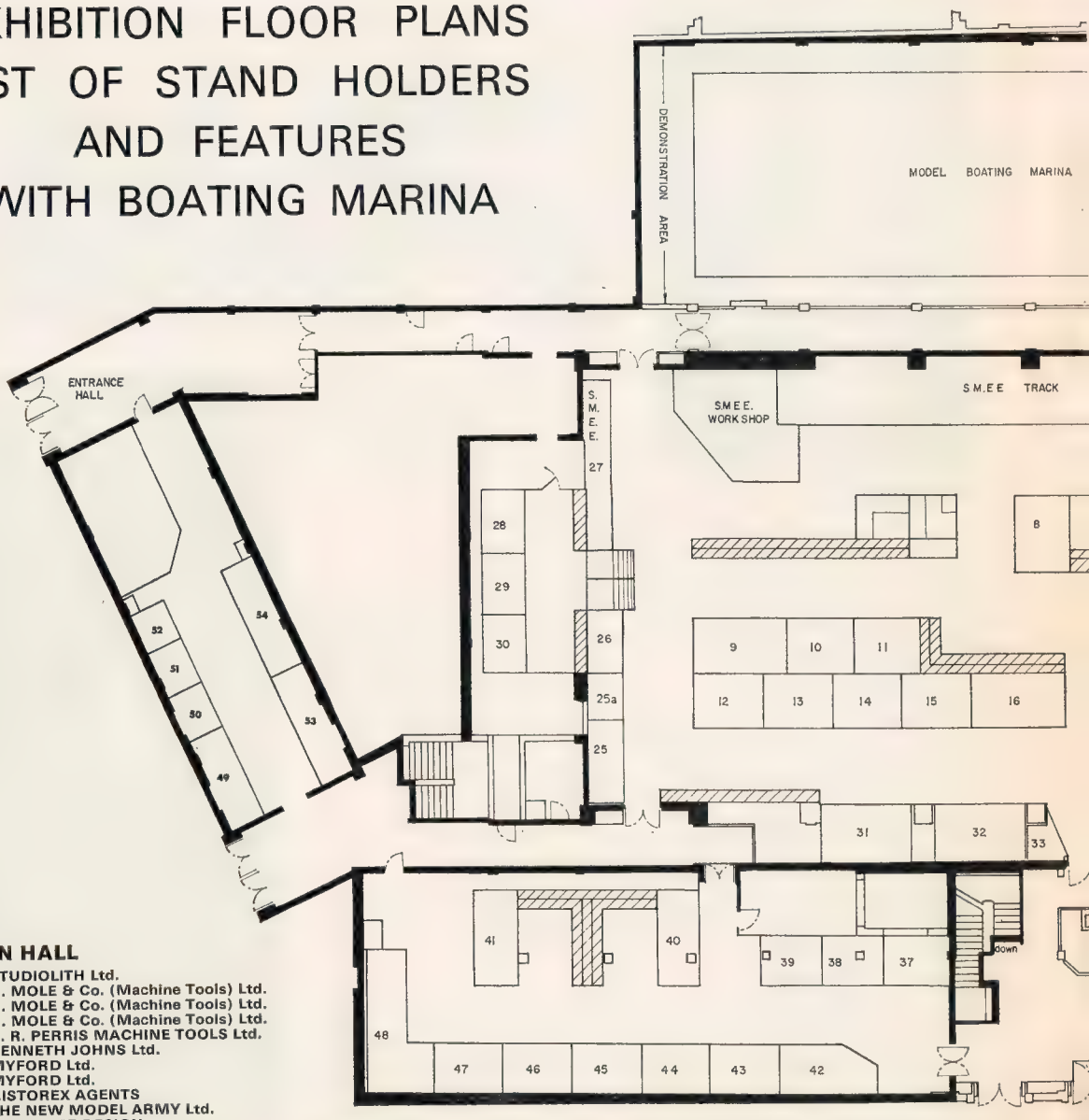

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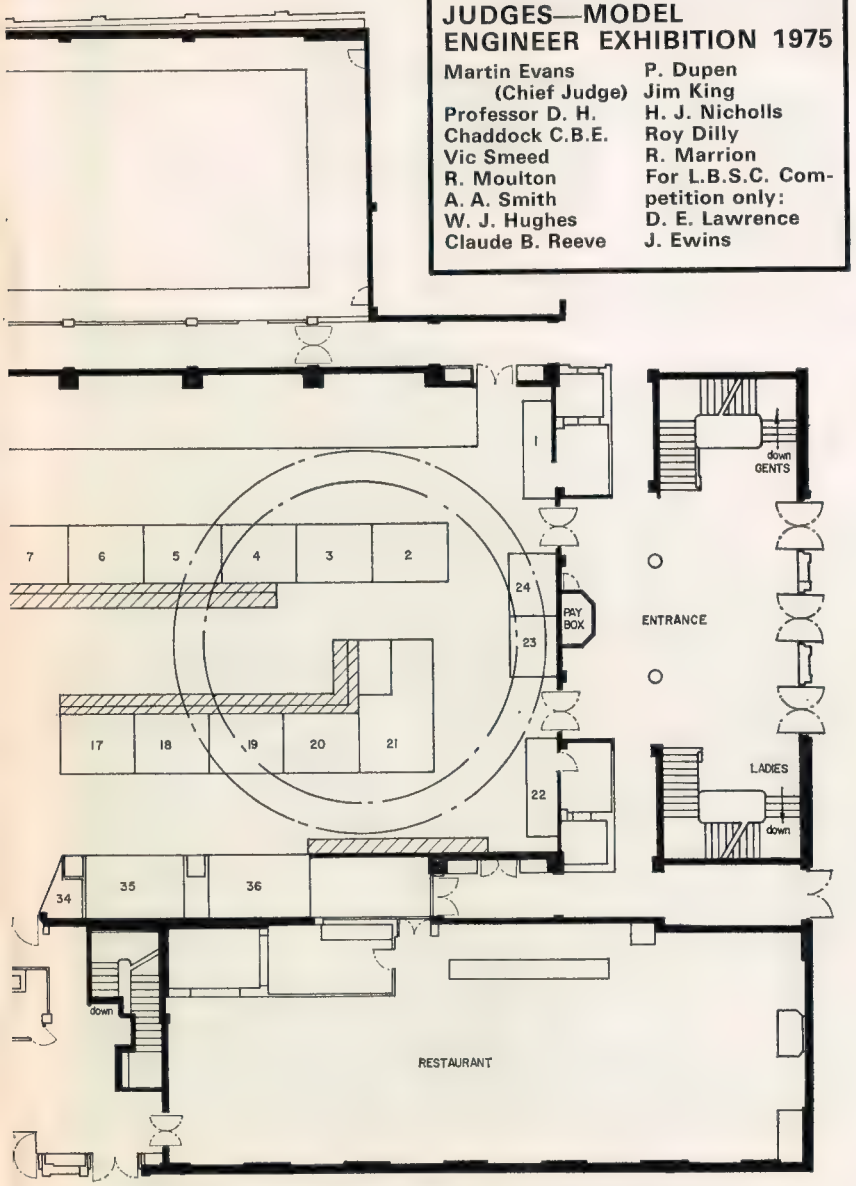

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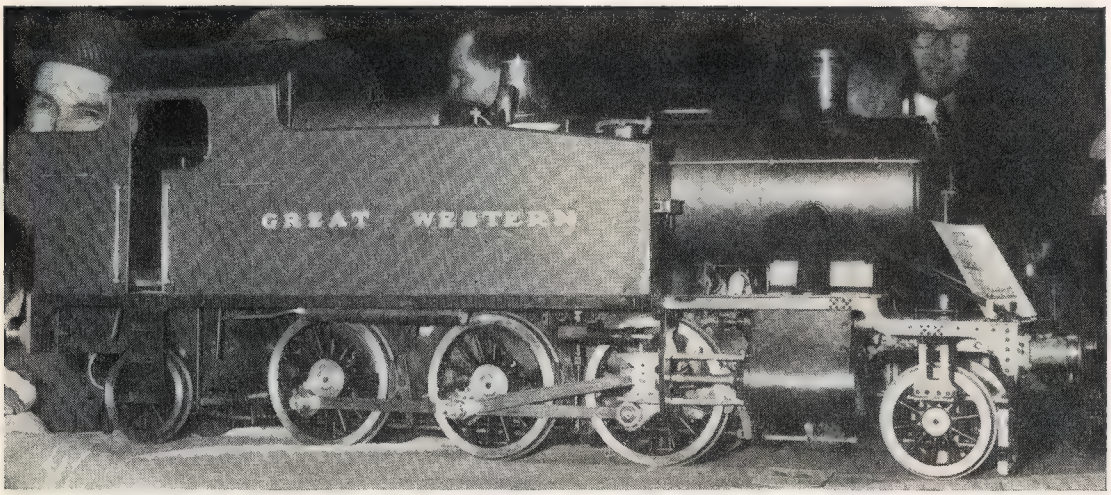


An unfinished model by Martin Evans of a 5 in. gauge GWR 2-6-2T.

JIGS & FIXTURES in Model Locomotive Construction

By MARTIN EVANS

IT HAS ALWAYS seemed to me that our locomotive builders tend to make less use of any kind of jig or fixture in their work than other model engineers. Perhaps this is because they are nearly always in a hurry to see their latest product in steam on the track!

In model locomotive construction, however, there are many instances where the making of a few simple jigs or fixtures can not only make for much greater accuracy, but can speed up the work. There is also the great advantage that such jigs can be used again and again, for future locomotive building projects.

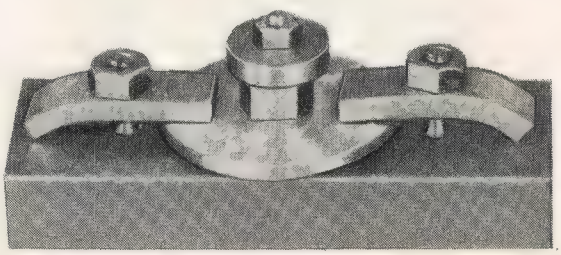
Before I go further, perhaps I should attempt to define the words jig and fixture, as they are applied to mechanical engineering. My technical dictionary defines a jig as an appliance used in a machine shop for accurately guiding and locating tools during the operations involved in producing interchangeable parts. No definition is given of a fixture, but most engineers would agree that there is no hard and fast line between the two terms. A milling attachment that is bolted to the lathe for the purpose of producing a number of similar parts might be called a fixture; though the term might be better applied to a fitting such as a carriage stop, bolted permanently to a centre lathe for repetition work. However, the exact definition of these terms need not worry us unduly, so let us go on to consider some simple appliances that will help us on our way.

Perhaps the simplest jig, but one of the most useful, is a drilling jig for drilling the crankpin holes in driving and coupled wheels. For a 5 in. gauge locomotive, this need not be anything more elaborate than a short length of steel about 1 in. x $\frac{3}{8}$ in. section, with two holes drilled at the desired throw centres. One hole acts as the guide for the drill; into the other we press home a short length of round silver-steel of such a diameter that it is a good fit in the axle hole in the wheel. The jig is then correctly located over the crank boss, and the crankpin hole drilled.

In some cases, the drilling machine that is available for this simple operation may not be large enough, in which case resort may be made to the lathe. The wheel may be bolted to the faceplate, the required hole being located by a centre in the tailstock. Another method is to clamp the wheel to a large angle plate, bolted direct to the lathe cross-slide. The hole in this case can be accurately located by means of a short stub of silver-steel previously turned in position in the 3-jaw chuck, or a collet may be used. Further, the crankpin hole could be started with a centre-drill, drilled undersize and the hole finished by boring.

Another most useful jig is one for drilling the coupling rods. It is not always easy to get the centres of the coupling rods to exactly match the centres of the axleboxes, especially in six and eight-coupled locomotives. Assuming that the axleboxes are in place in their horns, but the wheels and axles not yet fitted, a useful jig can be made from a straight bar of steel about $\frac{1}{4}$ in. thick by $1\frac{1}{4}$ in. (for a 5 in. gauge engine, other gauges in proportion). This is drilled with holes corresponding to the axlebox positions, using dividers taken off the job itself. One hole is now left completely circular but the other hole or holes are opened out to an oval shape. Drilling bushes are now turned from silver-steel, one being made a press fit in the circular hole, but the others are turned to an accurate fit in the holes in the axleboxes, and are then turned down, threaded and fitted with nuts, so that they can be bolted to the jig. These bushes must of course be drilled and reamed concentric with the outside diameter.

A useful jig for machining rear cylinder covers.



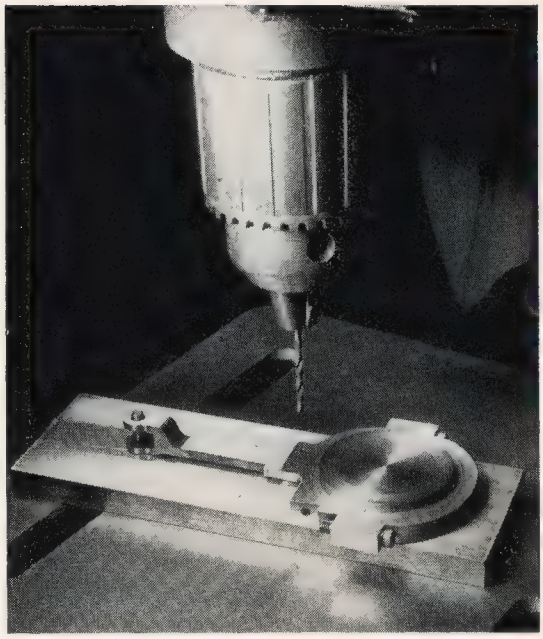
The nuts on the "movable" bushes are now slacked off, and the jig applied to the locomotive, the bushes being inserted into the holes in the axleboxes, and the nuts tightened up while the bushes are still in position. We now have a drilling jig that exactly matches the centres of the axles of the locomotive.

Some builders have reversed this process, making the coupling rods first—before drilling the axleboxes—and using the rods to drill locating holes in the axleboxes, which are then marked and removed for boring in another jig on the lathe faceplate. In this case, of course, the coupling rods may themselves be described as jigs.

The operation usually known as "quartering" the wheels on their axles lends itself admirably to jig making. In two-cylinder locomotives, the cranks on one side of the locomotive must be at 90° to those on the other side; the usual practice is that the right-hand crank leads. It will be appreciated that if the wheels are not *exactly* at 90°, no harm will result, but each pair of wheels must be at exactly the same angle as the others.

I have tried out at least four different methods of wheel quartering, and I have come to the conclusion that the best method of all is to make a proper jig. My own quartering jig consists of two plates of $\frac{3}{16}$ in. steel held apart by accurately turned stretchers which are long enough to allow the wheels and axles to be inserted between them. Holes are drilled in the plates (the plates being clamped together for the purpose) at the axle centres and at the two positions for the crankpins, at 90° to one another. The axle is supported by short centres, turned from silver-steel, and inserted through the central holes, while the crankpins pass through their respective holes as the jig is bolted up. If the wheels are being secured on their axles by Loctite, the adhesive is applied to the axle before the pair of wheels is inserted in the jig, in which case the wheels can be left while the adhesive sets—for 24 hours if necessary.

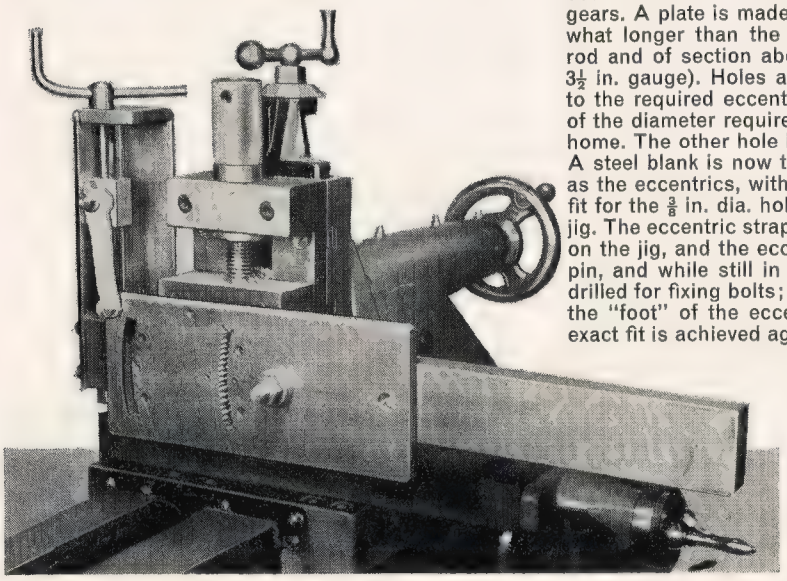
If it is desired to use press fits, this jig can still be used to "start" the wheels on their axles. The wheels are then removed for pressing about half way home, when they are returned to the jig for testing, in case they have twisted slightly while being pressed on.



The utility of this type of jig can be increased by drilling further holes at 180° to the first pair, at different throws, so that different types of locomotives can be accommodated. Further, in the case of driving wheels which may have crankpins of larger diameter than the coupled wheels, the problem of accommodating these in the jig is simple—the holes in the plates are reamed an exact fit for the larger crankpins, and gunmetal bushes are provided, a push fit in the holes to receive the smaller crankpins.

Valve gear jigs

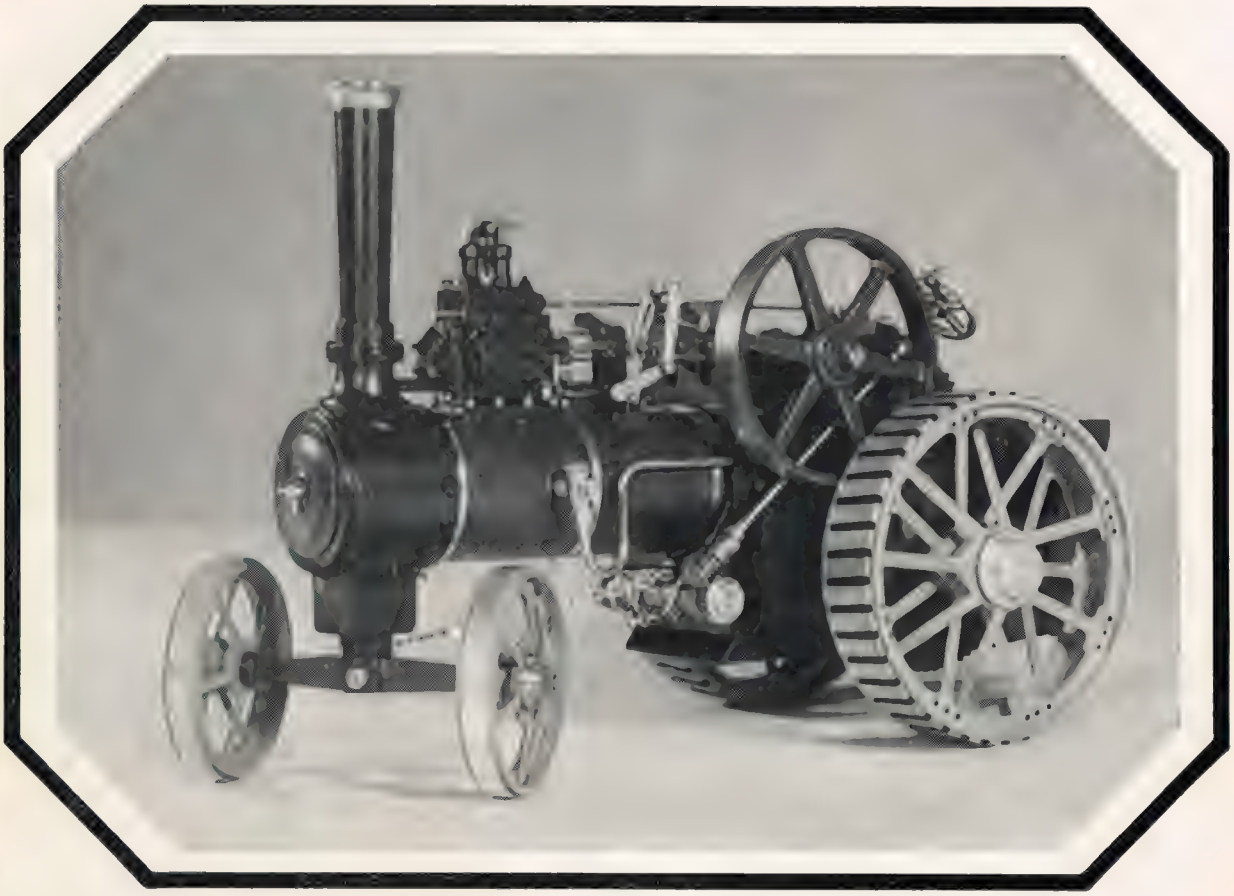
Another most useful jig, in fact essential for accurate valve setting, is one for determining the length of the eccentric rods for Stephenson and similar link valve gears. A plate is made up from bright steel bar somewhat longer than the overall length of the eccentric rod and of section about 2 in. x $\frac{3}{8}$ in. ($1\frac{1}{2}$ in. wide for $3\frac{1}{2}$ in. gauge). Holes are drilled in this corresponding to the required eccentric rod centres. Into one, a pin of the diameter required for the forked end is pressed home. The other hole is opened out to about $\frac{3}{8}$ in. dia. A steel blank is now turned up, to the same diameter as the eccentrics, with an extension turned to a press fit for the $\frac{3}{8}$ in. dia. hole. This is now pressed into the jig. The eccentric straps are then placed over the blank on the jig, and the eccentric rod located over the first pin, and while still in position, the rod and strap are drilled for fixing bolts; or if studs in the strap are used, the "foot" of the eccentric rod is machined until an exact fit is achieved against the strap.



Above: Jig for assembling eccentric rods—Stephenson link valve gear.

Milling attachment for cutting link slots, shown in position on vertical slide.

The Allchin 1906



See this ¾" scale model of an Allchin traction engine and other working steam models, at Stand No. 37.

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Who Wants to be a Millionaire?

ECONOMISE WITH ALEC GEE . . .

THERE CANNOT be too many creative hobbies—let alone those involving the making of models—which are still relatively inexpensive to enjoy in these inflationary times; military modelling in most of its various forms, is, happily, such a hobby and this, undoubtedly, goes a long way in accounting for the ever-increasing popularity of the pastime. For it's absolutely true to say that, given a modest collection of "tools of the trade" in the shape of a couple or three good quality paint brushes and a selection of paints (it's amazing how many shades can be quickly mixed up simply from the "primaries"—matt yellow, red, blue, black and white), the maximum modelling pleasure can be achieved for an outlay as low as 8p for a good 25 mm. foot figure.

Musician of Chasseurs a Cheval 1806 by E. A. Pollard of Nottingham who had great fun transforming a relatively inexpensive kit of parts to a piece of modellers' art.

"Single figure and base" theme in the ultimate! Napoleonic Cuirassier in stable dress; lantern lights up from switch in base.

Many will go beyond merely painting the figure, although this alone can, surprisingly, account for at least a couple of evenings of intense enjoyment bringing character in the form of facial details and expression—and finally life itself in the application of a colourful uniform with its shaded folds and creases, the tears and mud of battle round boots and trouser bottoms, the straps and belts of sword and equipment. The more industrious will take a good scrap of laminated timber, or the simple plastic screw cap from a jar, and upon it create a miniature landscape, a complementary setting upon which to display their finished model. Plasticine with varnish pools and short tufts of sisal string will supply the groundwork while a slim twig will represent the trunk of a tree and finely chopped and glued-on foam plastic particles painted greens and browns, the foliage. Some may

build small portions of a ruined, shell-shattered fence from split matchwood; others a wrecked dry stone wall from pebbles from the garden.

Still other modellers—and we're with the more ingenious and imaginative now, will, maybe, embellish this tiny base with a scratchbuilt model of a well from scrap balsa; or perhaps a signpost or a cannon or ammunition limber. Some may even carefully modify the basic figure by bending and altering the position of limbs so that the diminutive warrior kneels to examine a fallen helmet or carbine, pats a small dog, or sits astride a fence or stile, even lounges in the grass beneath a hedge smoking a pipe! Individual skills and ability are the only true limiting factors in military figure modelling because, once you've bought or collected the few, inexpensive tools you need (swiss files, a small jewellers' saw, a modelling knife and spare blades etc.), there is every bit as much fun to be had on a low modelling budget as a large one. A fact which we hope the foregoing notes have proved.

Of course, what one does by way of development upon the basis of this 25 mm. foot figure starting point is entirely a matter for the individual modeller; unlike so very many other model making activities, model soldier collecting, painting, converting and displaying carries its own very real species of "top limit" price tag—a price per kit or assembled white metal casting which none but the senselessly extravagant would be tempted to exceed, or indeed asked by any manufacturer to pay. The unpainted model or kit, the "raw material" of the hobby so to speak, is the least costly part of the whole operation; a good 25 mm. foot figure will sell for between 8p and 12p, mounted figures between 12p and 20p and few 54 mm. foot subjects in metal cost more than £1.50. On the plastic front, a top quality Airfix mounted model (Series 2)—the starting point for many master converters and modelling artists—will set its buyer back a mere 38p! In terms of hours of pleasure in the building, painting and displaying alone, not to mention the endless joy to be had down the years from a growing collection of one's own unique work, there are, we think you'll agree, rather more pricey hobbies with, arguably, less pure satisfaction and sense of achievement attached.

For the most valuable item a military modeller can spend on his hobby, be he a figure enthusiast or an A.F.V. fan, is not to be measured in cash terms—relatively small though these are as we have demonstrated. Time and skill, ingenuity and imagination are the truly priceless ingredients which mark this hobby as something very special indeed. Visitors to Model Engineer Exhibitions in recent years will have no doubt seen memorable examples of the military modeller's art, and, if not, then a glance round this year's show with its record

"Saving his Bunkie" an action-packed two figure set-piece by Norman Abbey based on a western painting by Schreyvogel. Constructed from a combination of the cheapest plastic kit parts it shows that a lot of money is unnecessary!

Bill Hearn's "Military Policeman, Europe 1944" uses Harley Davidson m/c kit plus figure plus great skill . . . very little cost in anything but time.

Heading and below; outstanding examples of expert finishing and display of standard 1/35 scale plastic kits by Belgian enthusiasts F. Verlinden-Sluyts and Eugene de Pesseray

"Spoils of War" by G. Wilson illustrates superbly how a pair of inexpensive figures can be combined and transformed into a finished item of imagination and ingenuity.

Another Bill Hearn special — "Hostile Apache" — using inexpensive sculpture paste for most of the work.

entry in the military competition classes will serve as an unforgettable introduction. For those who may be sufficiently interested by what they see to want to know more —and there can be few who will fail to be impressed by the quantity and quality of this year's military exhibits —we offer the following notes. They touch briefly on a few outstanding M.E. Exhibition entries from the recent past; all the subjects are loaded with practical ideas and tips which the imaginative will utilize in creations of their own and all have one important thing in common. They were relatively inexpensive to build in terms of materials used—but quite the opposite in terms of the expenditure of skill, artistry, time and patience which have gone into their creation. It would be difficult to put a price on any of them!

Take, for example, the superb Silver Medal-winning "Winter Hunting" by regular M.E. Exhibition contender (and equally regular prize-winner!) D. M. Catley of Reigate, Surrey. The setting for the scene was the frozen wastes of North America in winter and the action depicted a pair of Indian braves hunting and captured in the act of shooting a deer from the cover of a wooded knoll. All around is thick snow and the Indian about to fire steadies his arm by resting his rifle on a snowshoe which he has pushed down into the snow so that it stands upright. A skilful scene based on two heavily modified plastic foot figures, some twigs and thin branches, "plaster" snow, and a lot of ingenuity—but nothing expensive to buy and an excellent example of the sort of model we are discussing.

Other good examples have come from modeller Bill Hearne over the years and his entries in the 1975 M.E. Exhibition competitions in particular reflect this theme of producing masterworks from inexpensive basics. His two principal models at last year's Show (they both won silver medals!) used figures which Bill had entirely originated himself; they were sculptures of a superb marauding Apache warrior and a breathtaking American military policeman complete with tinted sunglasses and seated astride ESCI's 1/9 W.W.II Harley-Davidson motorcycle model. Not within everyone's capabilities perhaps, but undeniably inexpensive and certainly targets of achievement well worth aiming for . . .

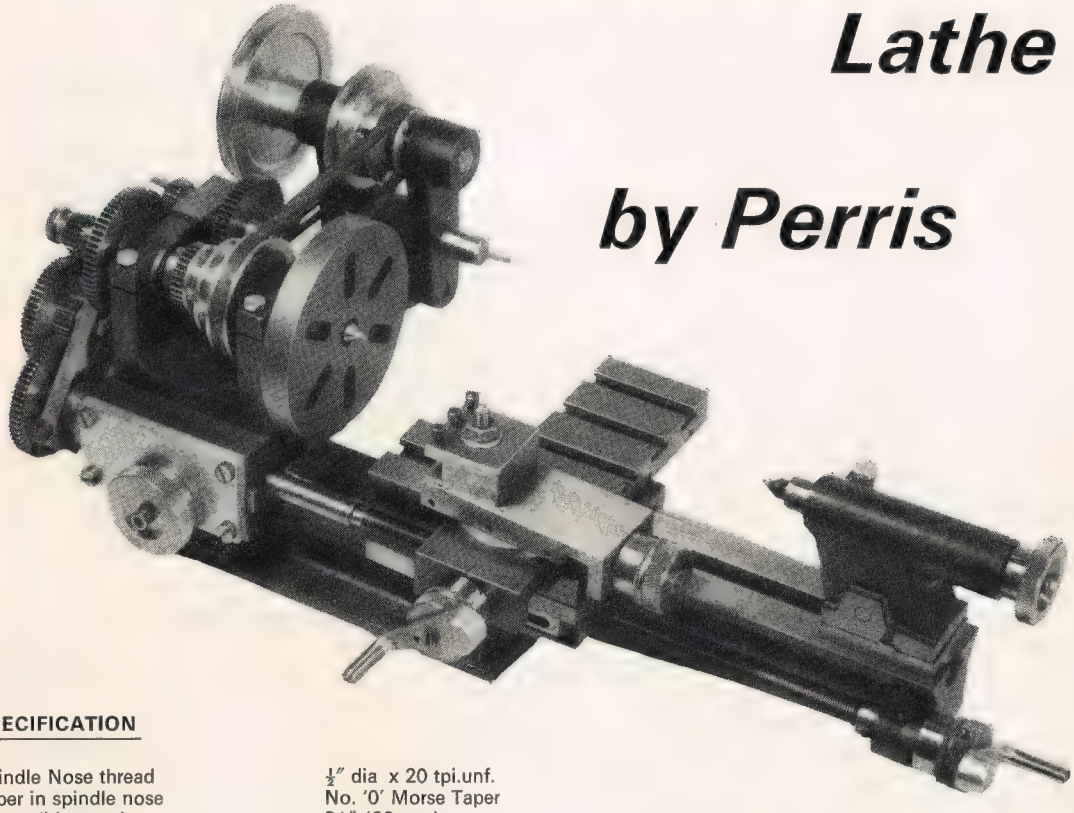
Getting the maximum from a basic model was never better demonstrated than by Belgian A.F.V. enthusiasts F. Verlinden-Sluyts and Eugene de Pesseray whose beautiful treatment of Tamiya 1/35 scale vehicle kits must have provided inspiration for hundreds of modellers. Each finished model was imaginatively mounted upon its own rectangular wooden base embellished by the addition of two or three appropriate figures (also plastic and Tamiya) engaged in some simple yet plausible activity; for instance, a pair of disgruntled Tommies—one on his back under the vehicle—were shown trying to repair a broken-down Quad Gun Tractor amidst the dust and stones of a Tunisian track. In another scene a couple of G.I.s were depicted having left their ¾ Ton Weapons Carrier and were studying a road map by the side of a well (there's that well again!) somewhere in France. By careful construction it's possible to make normally-standing figures sit and then, like the 25 mm. metal subjects we discussed at the beginning, actually do something—read, point etc.—thus providing complementary interest for vehicle settings as in the cases described.

Typical of the degree of detail it's possible to put into the single figure subject (54 mm. scale this time) was the clever idea and setting for a well executed French Napoleonic Cuirassier of the 1st Regiment 1812 by M. D. Harper of Arnold, Nottinghamshire. It illustrates perfectly how, by skilled conversion, painting and display, a basic figure becomes a thing unique and of great value. The subject, an N.C.O. in stable dress and wearing a cloak, was depicted carrying a pitchfork loaded with hay and obviously in the act of feeding his

(Continued on page 28)

Silver Medal winning "Winter Hunting" by D. M. Catley. Twigs from the garden, clear resin for pond, thin plaster for snow create a memorable set-piece.

The MODEL ENGINEER'S Lathe by Perris



SPECIFICATION

Spindle Nose thread	½″ dia x 20 tpi.unf.
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Cross slide travel	3½″ (89 mm)
Topslide travel	1½″ (38 mm)
Tailstock barrel travel	1¼″ (32 mm.)
Taper in tailstock barrel	No. '0' Morse Taper
Centre Height	1¾″ (44 mm)
Distance between centres	8″ (203 mm) max.
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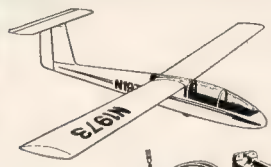

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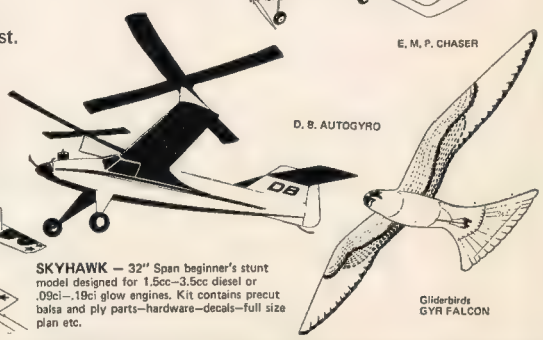

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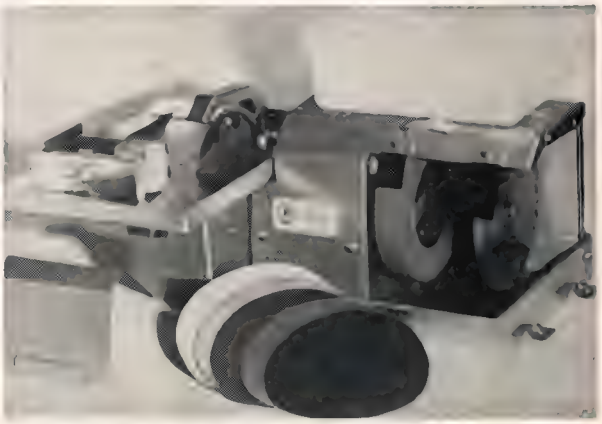

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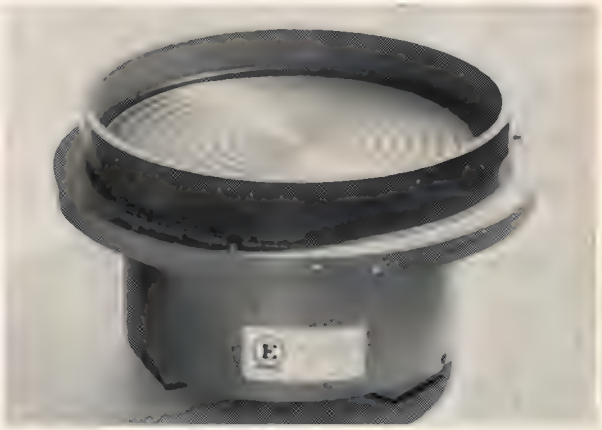

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The Scale Model Traction Engine

BY W. J. HUGHES

AN ENCOURAGING feature of exhibitions, both national and local, over the past twenty years or so, is that an increasing number of scale model traction engines have made their appearance. True, there is the occasional "bad" year, but this is more than made up for by the generally improved quality of the models of the whole period—which does not apply solely to the traction engine class, of course.

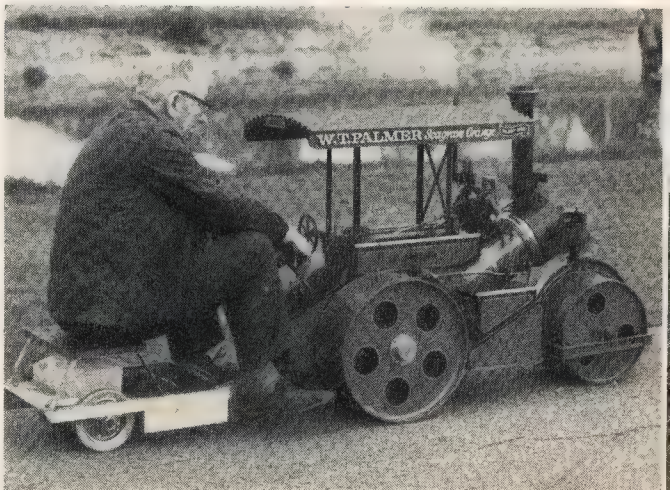
To a large extent the exhibitions themselves encourage the improvement, in that visitors can and do become inspired to greater heights by seeing what others have accomplished. The Trade also deserves some of the credit, in making more castings and other supplies available, and not least is *Model Engineer* in providing designs, guidance and instruction for all. In one respect, too, the would be builder of a traction engine is especially favoured, in that, during the summer months at least, so many full-sized engines are open to view on the rally fields.

Occasionally I am asked what scale is "best" to choose for a traction engine model, and can reply only that this depends on many things. At the *Model Engineer Exhibition* last year Mr. K. Hobbs exhibited a very fine Allchin traction engine which he had reduced from $1\frac{1}{2}$ in scale to 15 mm. to the foot, which is rather less than $\frac{5}{6}$ in. to the foot. He described this model recently (15th August) in *Model Engineer* and gave his perfectly adequate reasons for using that scale, so I need not repeat them here.

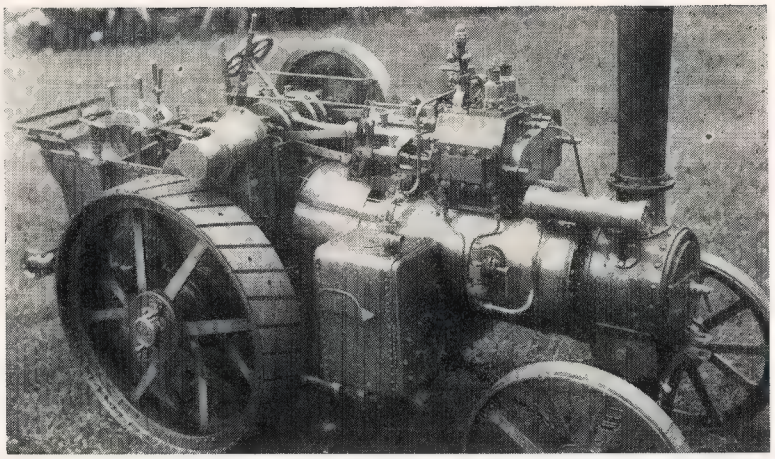
Miss Cherry Hinds usually uses a scale of $\frac{3}{4}$ in. to 1 ft., though this year she is to delight us with a showman's engine in 1 in. scale. But Miss Hinds does not build engines for regular running; she makes sure that they *will* steam and run, and then houses them in glass cases. She delights in the small work, and like many modellers is much more interested in the building than the running.

At the other end of the scale there have been built recently three or four 6 in. scale models, by commercial firms to order. One of them is the Foster "Little Gem"

A winner of the Duke of Edinburgh Trophy, Len Crane and his 3 in. scale Burrell "Brigitte."



W. T. Palmer drives his $4\frac{1}{2}$ in. scale Wallis and Steevens "Simplicity" roller at Leicester.



Left: The author driving a 6 in. scale Foster traction engine (Photo by R.Moore).

Right: A wealth of detail on a 2 in. scale Marshall compound tractor by the late Bill Jarvis.

seen in Fig. 1, which also was more fully described and illustrated in our 15th August number. This *has* been built for regular and in fact frequent passenger hauling, and must earn its living at it, at a great country house in the North of England.

So here we have two extremes, neither of which is suited to the requirements of most would be builders who want to do some serious passenger hauling. Anything less than 1½ in. scale is too light for this and has not sufficient power (as I have said on previous occasions), and 6 in. scale is too heavy, too big for the average workshop, and much more powerful than necessary.

Another factor to be borne in mind is the physical size of the prototype. For example a five ton tractor is much smaller than a general purpose traction engine, and a showman's road locomotive is appreciably bigger. Figure 2 shows the Marshall five ton tractor built to 2 in. scale, which is approximately the same size and weight as the 1½ in. scale Allchin, and develops approximately the same power. A showman's engine of 1½ in. scale could weigh about half as much again—say about 100 lb. against 70 lb.—and would be nearly 3 ft. long as against 26 in. or so.

So that where the first two examples named can be handled by one man—into the boot of a car for instance—the last would be too long and awkward, and probably too heavy.

At the same time it is a fact that there is a tendency nowadays towards using bigger scales. It applies in the locomotive world too; where at one time a 3½ in. gauge engine was considered large, the 5 in. gauge is now commonplace and even the 7¼ in. has made some headway.

With traction engines 1½ in. scale is the limit of workshop capacity of many builders, but even so the number of 2 in. and 3 in. scale engines grows steadily. Mr. Palmer's Wallis and Steevens "Simplicity" roller shown in Fig. 3 is to a larger scale still, at 4½ in. to 1 ft. but of course here the prototype engine was very small. It only weighed three tons and so the model is relatively small too. Even so it needs a car trailer to transport it.

Probably one of the factors which has helped most to foster the use of larger scales in both traction engines and railway locomotives is the increased availability of welding equipment to assist in the much heavier boiler work. The ability to build a boiler of the required size is equally as important as the capacity of one's machines, in determining the upper limit of scale to which one can work.

Forty years ago paraffin blow-lamps were the major source of heat, and how frustrating they could be! Then came that wonderful boost to efficiency, brazing tackle using the bottled gases derived from petroleum, and the horizons broadened immediately. And with welding equipment they have broadened yet again, and (almost) the sky is the limit.

But with the increase in dimensions comes the problem of increased cost, which in turn has led to an increasing use of steel boilers instead of copper, in the larger sizes of engine. In full size, of course, these have been in use for a very long time—long enough to be considered a safe proposition, generally speaking.

In the model steel boiler, however, whilst it may be designed with a fully adequate factor of safety initially, it must not be forgotten that corrosion will work at the same rate as in full-size. In other words a ¼ in. thick plate will lose ⅛ in.—*half* its thickness—in the same time that a ½ in. one will only lose a quarter of its thickness. On the thinner plate this would negate the factor of safety entirely.

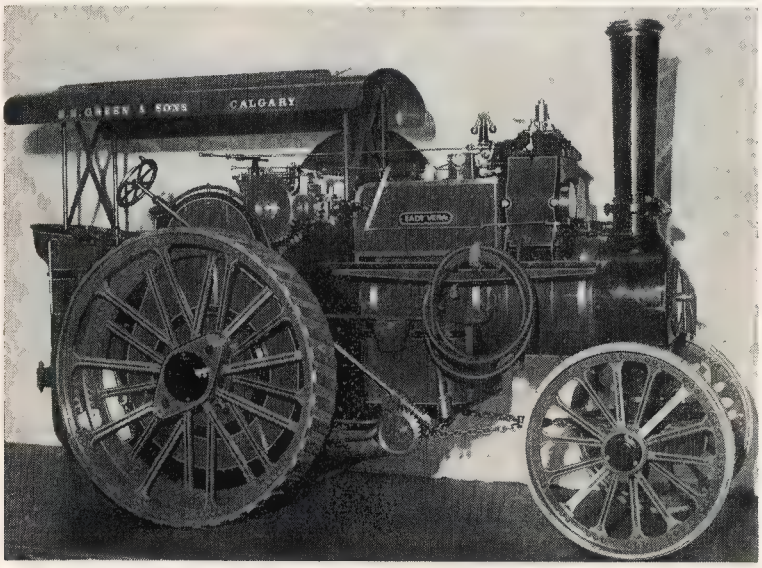
Personally I would rather stick to a 1½ in. or 2 in. scale

Al Park, of Calgary, Canada, rides behind his 1½ in. scale Allchin.

model with a copper boiler, than build a larger one with steel. After all, one can obtain the same pleasure from constructing a model in *any* reasonable scale, and a 1½ in. scale traction engine has enough power and stamina to haul several live passengers.

But obviously the would-be model builder will decide the question for himself, and rightly so. Ours is still, thank heaven, one of the free countries in the world! All I suggest is that he considers dispassionately all the facts—workshop facilities, availability of a good design (or if not, his own capacity for developing his own), and portability of the finished model, not only in the workshop but to such functions as rallies, track days, and exhibitions. Let him consider safety and peace of mind; and might not the cost of insuring and regularly inspecting a steel boiler total more in the long run than a copper one?

And having considered all these things, and doubtless other personal factors too, I trust that he will go ahead and thoroughly enjoy building and running his model traction engine, in safety and pleasure for many years to come.



Also from Calgary, Stan Green's magnificent 1½ in. scale Fowler road locomotive.

Who Wants to be a Millionaire?

(continued from page 22)

horse—which does not feature in the piece but is merely implied. The floor surface is well worn paving stones (plastic card rectangles filed and smoothed) and the whole is mounted upon a neat polished wood block. In a corner of the base, to balance the composition, was an upturned wooden pail and, on top of this, a beautiful scratchbuilt model lantern whose tiny bulb could be illuminated from a pair of penlite batteries and a switch concealed in the hollow base block. Outstanding.

Similar ingenious use of a complementary base was featured on a clever little 54 mm. two-figure setting entitled "Spoils of War" by G. Wilson of Hastings, Sussex. It gained a "Commended" at the 1975 Exhibition and comprised a couple of World War I French infantrymen and their "loot" which consisted of an earthen pitcher—presumably full of wine—and a wooden handcart with which to carry it (and, indeed, one of the figures) home. Again, not expensive to create but calling for skill and patience in plenty.

E. A. Pollard of Nottingham's superb "Trombone Player, Chasseurs a Cheval 1806" at last year's Exhibition represented the plastic mounted kit figure executed at its masterful best. Exquisitely painted and modified, the bespectacled musician was shown seated in the saddle, poring over a piece of sheet music while his impatient steed stamped the ground and swished a bored tail. Mounted upon a tiny rectangle of most convincing rocky grass, the finished model was presented on the top of a well finished, polished timber base.

And for a *piece de resistance* how about the beautiful "Saving his Bunkie" from inexpensive Airfix and Historex bits by Norman Abbey which you will be able to study at this year's Exhibition. Based on a painting by German-American artist Charles Schreyvogel, Abbey's outstanding 54 mm. scale recreation shows a U.S. Cavalryman of the 1860s leaning from the saddle of his full-galloping mount to catch a horseless comrade around the shoulders in an attempt to snatch him up and on to his own horse's back. Loaded with action and expression, the miniature is an ideal model composition and, although built up from perhaps as little as a poundsworth of parts and raw materials, a finished item of great beauty likely to sell, if it were ever offered, for possibly £75.00 or maybe more.

All of which goes to prove, we feel, that you don't need to spend a lot on this hobby to gain the maximum pleasure. And, as suggested, at the beginning, there cannot be too many creative hobbies about which you can say the same!

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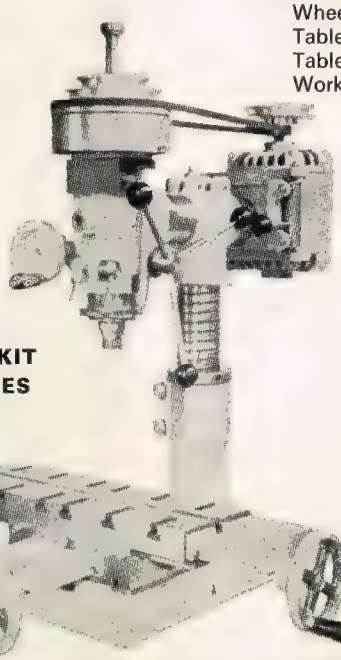

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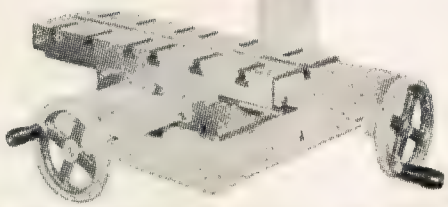

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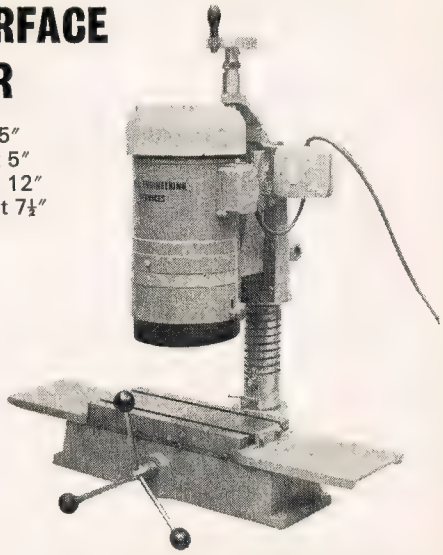

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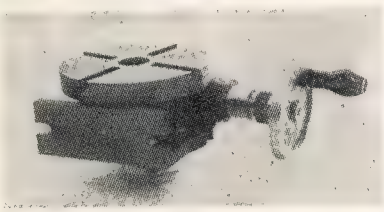

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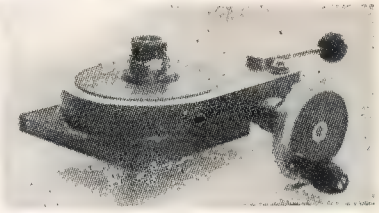

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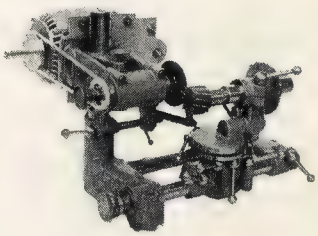

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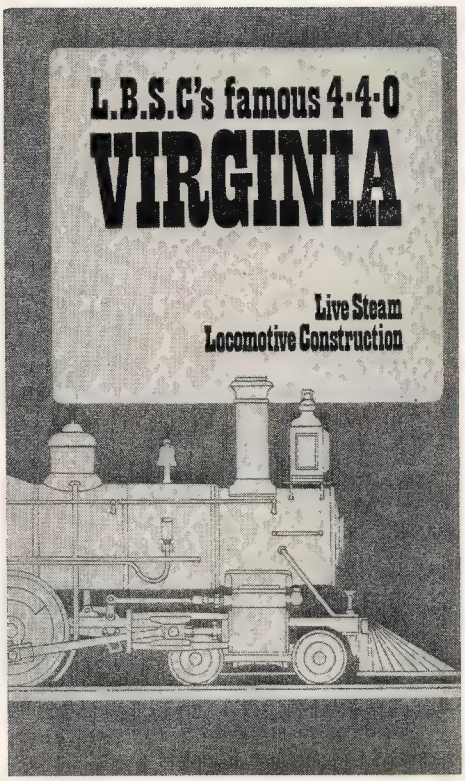

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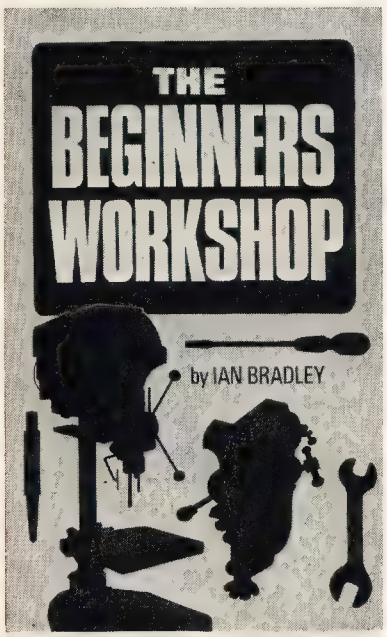

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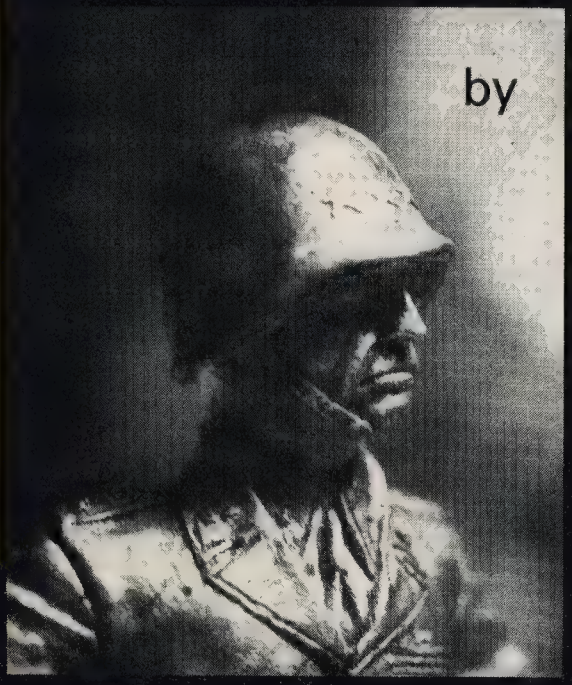

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Radio contr Yacht

Model Boats' Edito on this fast-growin

Four RM boats hitting the starting line at the first major international R/C yacht regatta at Gosport, August 1975. The una-rigged boat, K2103, finished top British boat in this class, 3rd after sailing off a three-boat tie for second place; skipper was Norman Curtis, Reading, and design a Stollery Bloodaxe.

Without a doubt the greatest growth area in modelling over the last two years has been radio-control yacht racing. The reasons have to some extent been environmental—no noise, no air or water pollution, so that many waters barred to other forms of boating can be used—plus the realisation that with radio, many stretches of water previously unsuitable for model yacht racing can now be used. There are, too, economic reasons, since the running costs of a yacht are negligible and sailing can often take place on a pond near to home; there is, too, the growing realisation that racing is skilled and exciting, while yacht design itself offers a challenge, especially since the new factor of powerful and continuing control creates the necessity of developing a new approach to design.

Vane-controlled racing yachts have been with us for years, and yet there is still steady development and progress in design. Because of the very small force available from the vane, such boats are carefully balanced hydrodynamically, and the method of racing encourages the ability to sail in a straight line. Much more power is available from a radio servo, so that it becomes possible to explore areas of advantage which unbalanced hulls may offer. There is thus a fundamental change taking place in yacht design thinking, in some ways almost starting from scratch and producing a situation attractive to experimentally minded modellers.

Many of the people getting into R/C yachting have little or no previous experience of models. In one or two cases new clubs have been formed where only 10-12 per cent of the members have previously sailed model yachts, the rest being dinghy sailors with a sprinkling of ex power boat and aeromodelling enthusiasts. A number of vane skippers have converted wholly to radio, and some others sail both types; over half the old-established clubs in the Model Yachting Association now have radio sections and many new clubs are radio only.

All the regular vane classes are recognised for radio, but far and away the most popular is the Marblehead class, 50 in. long and 800 sq. in. maximum sail area. Second comes the R10r, the 10-rater class, in which boats are around 80 in. in length with a sail area of around 1100 sq. in.; the rule relates waterline length with sail area, an increase in one causing a decrease in the other. Well down comes the RA class, averaging 7 ft. long and 50-60 lb. displacement and therefore rather large for convenient regular transportation. Few 36 in. R yachts have been fitted with R/C, possibly because no official races have yet been arranged for this class, and the 6m class is at present still struggling to survive in vane racing, only a dozen or so boats being registered.

The RM class, as radio Marbleheads are termed, is the most numerous in all countries affiliated to the International Model Yacht Racing Union, and in most countries generally, even those of Eastern Europe. The first-ever International Championship was held at Gosport, England, in August 1975, for the RM and R10r classes, and attracted a three-figure entry, with boats from America, Canada, Japan, Germany, France, Sweden, Holland, South Africa, and, of course, England; it was a wonderful week.

Questions usually asked about radio yachts are firstly to do with the controls. People always seem impressed when they are told that the sails are under full control as well as the rudder, but this is of course the essence of yacht sailing. Most models use synchronous control of both jib and mainsail, though some have a separate control for each sail and others a fine adjustment on the jib. Synchronous control means that the relationship between the sails is always reasonably correct, which is reassuring when the yacht is at a distance. It may be possible to travel slightly faster by jib-twiddling, but at 80 yards or more, by the time one is happy with the sail trim it is time to turn on to the next leg of the course!

Sail control is by means of a winch mechanism of some type. It may be a lever or an endless belt to which the sheets are attached, or a drum or drums winding in the sheets—there are many variants, especially as even today there are only three or four practical winches available commercially. To some extent it was the lack of availability of a ready-made winch which delayed the growth of R/C sailing. Many builders would tackle the yacht itself but shied at the idea of making a reliable winch.

A conventional rudder servo is the other control, and the tendency is for a "spade" rudder to be used, i.e. one in which the whole of the rudder moves rather

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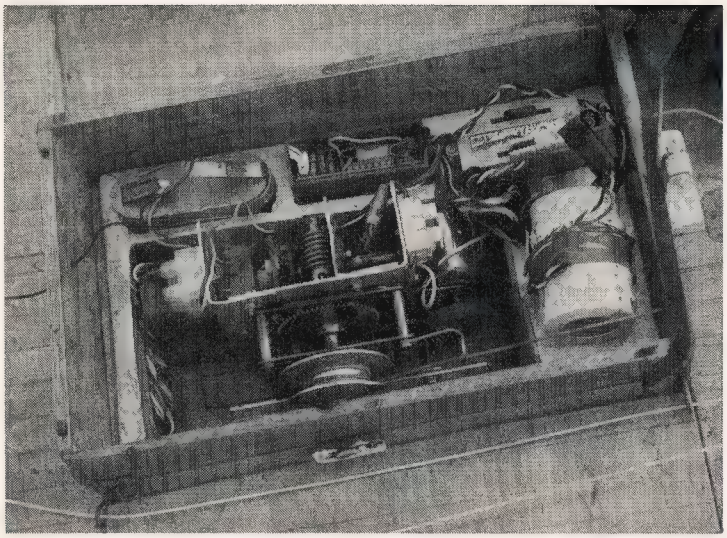
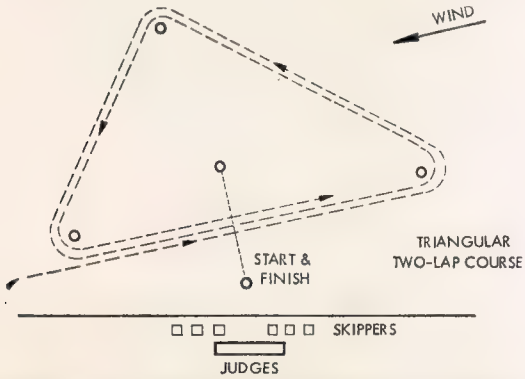


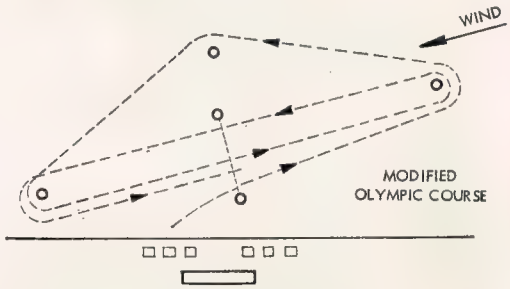
An amazing variety of home-built sail control mechanisms have been seen, initially because it was difficult to buy one but now often because it is cheaper to make one's own. This example uses a modified alarm clock mechanism, electrically driven, switched by a conventional radio servo, and has proved reliable under all conditions.

than a rudder hinged to a fixed skeg. R/C yachts have to be highly manoeuvrable, since six yachts turning the same buoy at the same time need to be able to change direction instantaneously.

Courses tend to limit the yachts to 60-70 yards from the skippers in order to keep them within reasonable sight; a race is after all a test of skipper and yacht rather than eyesight. Until recently a triangle of about 60 yard sides has been most frequently used, preferably starting with a windward leg and usually calling for two laps. There are now several clubs using a "modified Olympic course", as shown in the diagram, which some skippers feel gives a more interesting race. Rules used are based largely on full-size practice, and successful full-size skippers convert very readily to R/C racing, since they already have familiarity with the rules and a knowledge of tactical sailing; the latter often outweighs the advantage of a boat of slightly superior speed in the hands of a skipper not so aware of tactical possibilities.

While there are still some areas of Britain not well served by clubs, there are several dozen covering most of the population. If you would like to learn more about this fascinating and still fast-growing aspect of modelling, the Editor of Model Boats will gladly send you the address of your nearest club on receipt of a stamped addressed envelope.





SOME GOOD BOOKS ON THE SUBJECT...

The winter evenings provide not only opportunities for catching up on a model building programme but also afford reading time to swot up a new enterprise such as radio control model yachting. May we therefore recommend one or two suitable and inexpensive books to start the would-be operator on the right lines? For the entirely inexperienced who has yet to build a boat of any sort we suggest SIMPLE MODEL YACHTS by Vic Smeed. This is truly groundwork with details of three boats, profusely illustrated. It is *not* on radio control. For this then the book RADIO CONTROL MODEL YACHTS by C. R. Jeffries which goes thoroughly into the subject of R/C including advice on the recognised classes and choosing a suitable boat, equipment and installation, types of sail winch circuit diagrams. Rigging is also covered, learning to sail, racing and some useful appendices.

The enthusiast will probably wish to know more about the techniques of model yacht construction, and here we recommend R. Griffin's MODEL RACING YACHT CONSTRUCTION which details the various building methods, which are described in details with numerous line drawings.

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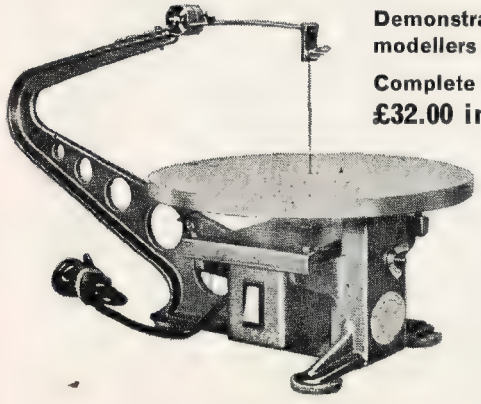

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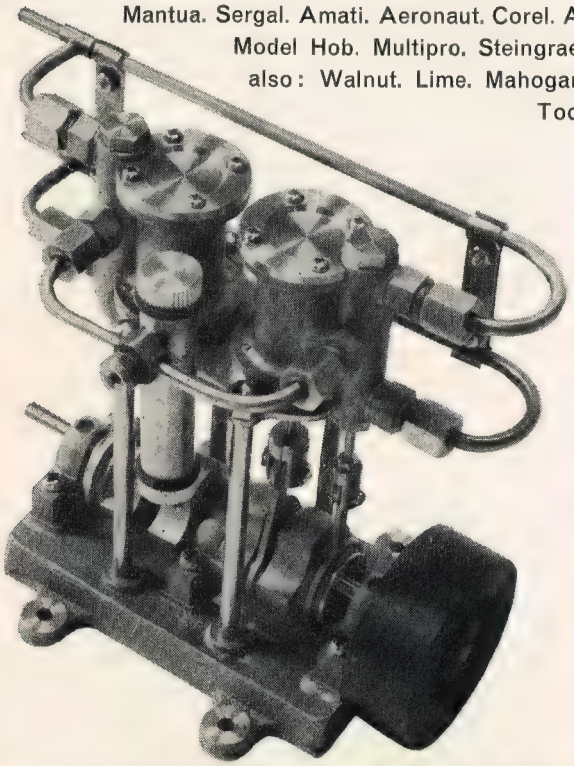

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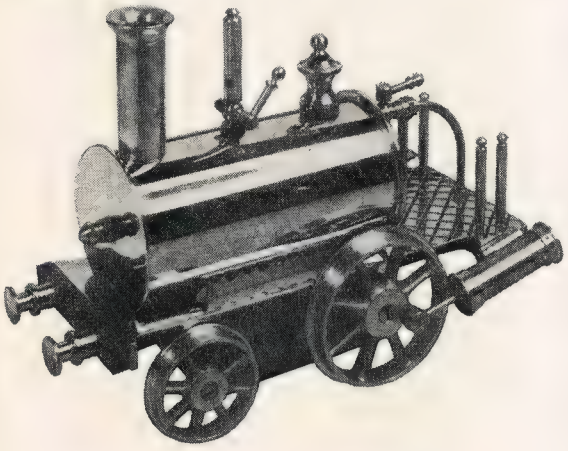

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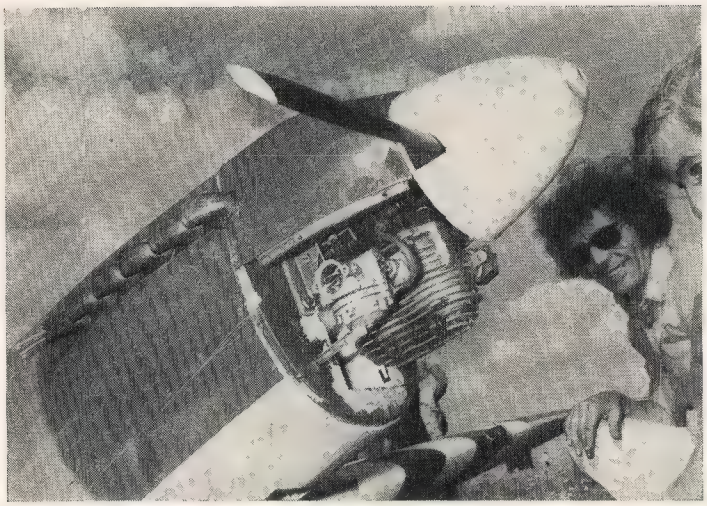


1975 A Year of Sophistication

REPORT BY RON MOULTON

Twin-cylinder 110 c c. two-stroke driving a 24 in. cast alloy propeller powers this 2/7 scale Spitfire which belongs to the Jim Davis Display Team. A sister model crossed the Channel in 35 minutes on June 6th 1975. Span is 10 ft. 3 in.

THE RATE of progress in manufacturing methods, model design and control systems for model aircraft has been accelerating through the 70s. This past year was exceptionally rich in new ideas and achievements. So much so, that 1975 must be regarded as a significant milestone, appropriate to our passage through three-quarters of the 29th Century.

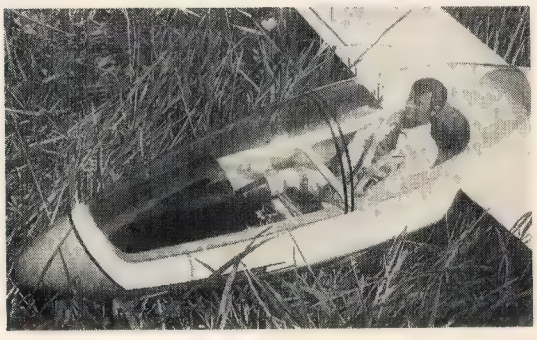
And all this despite National recessions, industrial lay-offs and crippling inflation! Leisure occupations are notorious for their inverse scale of prosperity when compared with the welfare of the National economy.

The year opened with outstanding exhibitions and trade fairs—the "Model Engineer" included. February is the month for revelation of new prototype model kits and equipment, and 1975 was no exception. Electric power, small helicopters, new engines and large scale plastic kits were the surprise items in a glittering show of many new announcements.

Two months later, these same revelations were to be seen in action at the Easter R/C Expo, Sywell. Progress with electric drive leapt forward with the new single motor "Mosquito" by Graupner, and the big Astro units for larger models from the U.S.A. Rapidly rechargeable Nickel Cadmium cells provide a slip-in power pack that can be energised from the car battery, and the new form of drive motor is able to accept extremely high loadings. Thus one has the choice of using power in various ways. Either, one can elect to employ nominal power supply for a reasonable rate of climb to height, where the power is switched off and the prop folds to reduce drag for the glide, or the motor can be over-loaded and used more or less as a silent replacement for internal combustion in an aerobatic design. Such are the skills that a record of over 1 hour 32 minutes duration was established in September with an electric powered model in which power was continuously used. Yet this is still only the beginning. Free flight units for lightweight models are produced by Mabuchi in Japan as the A-1 and these use small cells which one recharges from a pack of torch batteries! The A-1 is a direct replacement for rubber or small engine drive in sport or scale models.

Nose of the Graupner Mosquito with folding plastic propeller and geared "Jumbo" motor drive. NiCad battery pack is stored under wing. Power is used to climb to height, then switched off for soaring.

Action Man "pilot" in a French R/C glider adds a last touch of realism to an already refined design. He also serves both to hide the equipment and to provide ballast!



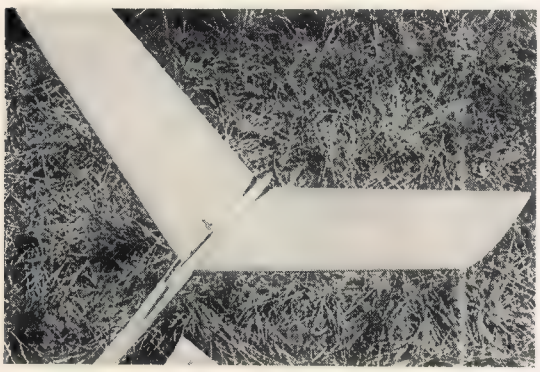
Aeromodelling

Helicopters are described elsewhere, suffice to say here that engineering has made extensive inroads into the traditional wooden kit business. By so doing the helicopter becomes attractive to a different modelling fraternity, unused to fixed wings and thus unfettered by conventional control practice. Within 6 months of the trade fairs, over 10,000 of the 1975 helicopter kits were in circulation. One is not to know what proportion of these reach the flight test stage—or actually leave the shop shelves; but one fact becomes clear, and that is how the sophistications of such rapid advancements outstrip the otherwise knowledgeable model shop assistants. It is a great credit to all the manufacturers concerned, British and German, that they have backed their sales with generally concise instructions.

On the continent, teach-in "Seminars" for shop managers are long established. We were able to see the UHU sponsored course at Buhl, Germany in April, where 120 retailers were taught in a week-long "*Fachhandels-Lehrgang*", how to sell and advise customers on everything from a glider to a tugboat. Prominent in the course was a session on electric power, and another on radio control theory. Practical tests with yachts, boats and flying models as well as engine starting resulted in issue of qualification certificates. Such excellent training helps to keep pace with the product. One is left to hope that the scheme eventually becomes established in Britain.

By mid-year, with brilliant skies, rainless and calm weeks, aeromodelling in 1975 was leaping ahead, In free flight competitions, the glider lost its old simplicity and became very complicated where experts were concerned. For the tactics of contest gliders are that the model is held on the towline until the tower "feels" a thermal. Unlike the kite which is a pressure plate, a glider is an aerodyne and flies on—or off the towline.

Super VC-10 by Harry Price weighs 11 lb., is 7 ft. span and is powered by two OS 25 motors in the outer nacelles, driving propellers. Model was spectacular at the 1975 British Nats.



All flying Vee tail on a German contest glider illustrates the sophisticated structure where the mechanism is contained in a very slender fuselage.

During the British Nats., Mick Charles attempted to break the 14 hr. 20 min. World Duration record for power models but a combination of engine troubles and strengthening winds terminated the flight at 4 hours.

It has to move in relation to the ground (according to windspeed) and a "circling tow" technique has developed to keep the glider wheeling around a more or less fixed point. Such tactics demand a spring tensioned connection in the model, also a tensioned line release device, as well as the timer, auto rudder etc. They are complex boxes of tricks which require careful use and go a long way towards reducing the luck element in model launching. Incidentally, the Soviet Union won the World Model Glider Championships yet again in '75. A North Korean won the Wakefield Trophy and a Swede, the World Power Model Championships.

It has also been the year in which the thermal soaring R/C glider has "come of age". For years, the radio controlled glider has been lacking support. While slope soaring became popular with fine attendance at all the rallies, the R/C glider which depended on a towline was not considered exciting. Then came a few International contests and in '75, the triple task event for Speed, Distance and Duration emerged to become a favourite. Silent flight has many obvious advantages, and the contest rules appeal to those who enjoy a mathematical challenge. The contest has produced

gliders with extending flaps, butterfly tails, spoilers, ballast and airbrakes. In each task the performance is converted to a percentage factor, and to win is a true triumph of calculation! Gliders can also be good fun to fly just for pleasure and that is why there are so many new glider kits on the market this year.

Scale Models always have a special fascination and for '75, there was an absolute galaxy of stars to be seen at the National Championships. Of these, the spectacular entry came in David Vaughan's "Wirraway", a model so incredibly realistic that it surpasses the standards of Museum exhibits. Though not the winner (it had slight radio malfunction) it was an inspiration to all. Every instrument in the two cockpits has minutely inscribed numerals, even the signs of wear on seats and footrests achieves such realism that a miniature crew might be expected to appear at any moment! Twice the scale (at 2/7 of full size) are the now famous Jim Davis' Spitfires. Built for display work with engines ranging from 35 to 110 cc, the Spitfires made history when JD-M was flown across the channel from Le Touquet to Lydd on 6 June. The flight took only 35 minutes to cover 55 miles, with controlling pilot Dave Wright in an accompanying Jetranger Helicopter. Such was his confidence that the Spitfire was put through a victory roll over the Kentish airfield runway on arrival!

Helmut Schenk from Pforzheim, W. Germany and his E-1 electric model which established a World Duration record in September of over 1 hr. 32 min. Motors are the two block rectangles near wing trailing edge, driving pusher props.

Top: Rear cockpit of the Wirraway. It is difficult to accept that this is a 1/7 scale model, weighing 9 lb. and which flies excellently with a Merco 61 engine.
Left: Emergency flap opens to reveal the fire extinguisher in David Vaughan's Wirraway. Every rivet and screw head is faithfully reproduced to 1/7 scale.

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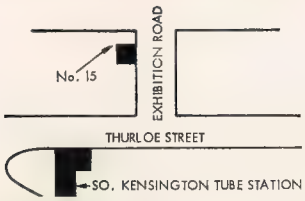

GOODNUS GRIEFIMUS'

Tempus Fugit an' that. It's nearly time to watch out for the big V-12 Snowmobile in the sky, listening for its 16 track stereo goin' ho-ho-ho! and duckin' as it rains parcels from its computerized delivery chute on all an' sundry (Interplanetary Times November 30th 2505). Shades of the old fashioned Christmas! Well we hope they will enjoy the season then as much as we do today. Just like we enjoy it when the Seagull delivers the goods all year round. An' incidentally, it's almost time for the ol' Seagull to make its usual exhibition on Stand 48 at the Model Engineer Show. Yes, folks, we'll have lots of 'goodies', a few surprises, plus the added attraction of S.P.'s answer to Billy Connolly — yes, the Malcolm Dawson!! Himself will be around for the first days to talk board gaming with the faithful, converted an' just interested. Malcolm's message — "Jus' bring yer wallet."

It only remains for us to say thanks again for your continuing support in '75, in '76 we will be trying to improve our service even more. Meanwhile have a great time wherever you are. Our compliments of the Season "an' a guid New Year tae ye a' ". Peace. From Ann, Alex, Martin and Peter.

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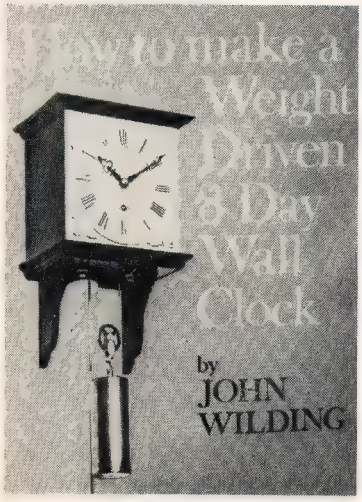

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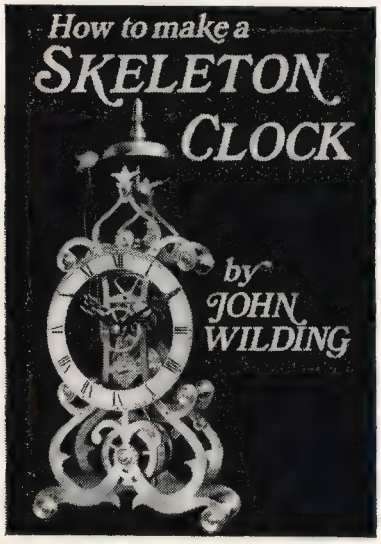

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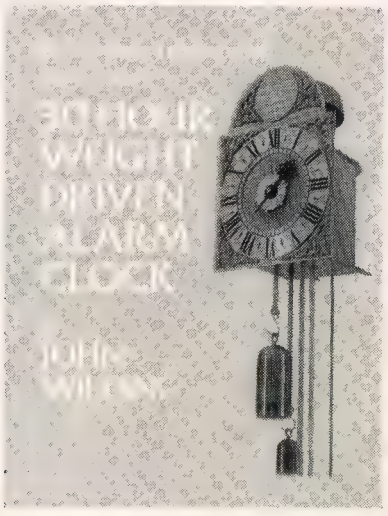

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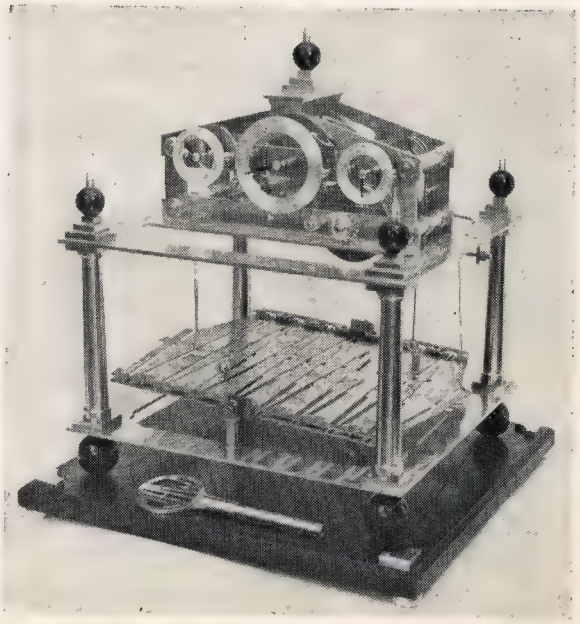

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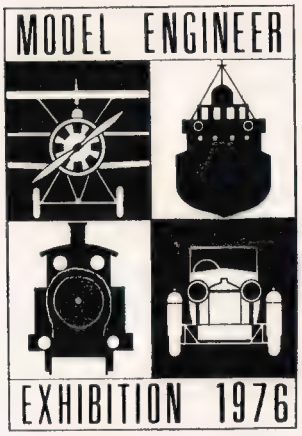

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No.	Description	Name and Town
1	Modified Dobcross Underpick Tappet Loom 1/6 scale	T. W. Millward *(Prestbury, Cheshire)*
2	Tug *Campaigner*	R. F. Clover *(Bushey Heath, Herts.)*
3	French 74 gun ship *Le Superbe*, 1785 1/600 scale	D. Hunnisett *(Aylesbury, Bucks.)*
4	British 18 gun brig of 1797 1/48 scale	L. S. Danilewicz *(Pwllheli, Gwynedd)*
5	Diagonal Paddle Engine P.S. *Isle of Arran* 1/24 scale	R. K. Moore *(Haverhill, Suffolk)*
6	Armstrong 12 pdr. field gun of 8 cwt., 1860, 1/8 scale	K. R. Gibbs *(Lydiard Millicent, Wilts.)*
7	H.M.S. *Ashanti*, Tribal class destroyer 1/96 scale	D. C. Brown *(London W4 1EL)*
8	Bristol Bulldog F/F scale aircraft 1/12 scale	R. E. Winters *(Sudbury, Suffolk)*
9	Steam tug *Danube VII* 7/16 scale	A. R. Falconer *(Catford, SE6 3BP)*
10	Single column beam engine 1/12 scale	A. Walshaw *(Nr. Kendal, Westmorland)*
11	Destroyer H.M.S. *Caesar* 1/96 scale	W. Nunn *(Battersea SW11)*

CLASS A: Locomotives. 2½ in. gauge and over

No.	Description	Name and Town
1	G.W.R 1500 Class 0-6-0T 5 in. gauge	R. L. Kibbey *(Mackworth, Derby)*
2	A1 Pacific *Flying Scotsman* 5 in. gauge	L. O. Nelson *(Honley, Huddersfield)*
3	G.W.R 1500 Class 0-6-0T 5 in. gauge	T. W. Millward *(Prestbury, Cheshire)*
4	Small boiler *Tich* 0-4-0 3½ in. gauge	J. N. Summerfield *(Orpington, Kent)*
5	L.B.S.C. 4-6-4T *Remembrance* 5 in gauge	R. J. W. Heslop *(Thirsk, Yorks.)*
6	A1 Pacific *Flying Scotsman* 2½ in. gauge	R. J. Penn *(Birmingham)*
7	London, Chatham & Dover Europa Class 2-4-0 *Asia* 5 in. gauge	L. A. Saxby *(Hillingdon, Middx.)*
8	Rebuilt *Royal Scot* 5 in. gauge	C. H. Cosmelli *(Bognor Regis, Sussex)*
9	*City of Truro* 5 in. gauge	W. E. Sockett *(Tipton, W. Midlands)*
10	L.N.W.R. 2-4-0 *Precedent* 5 in. gauge	W. Finch *(Birmingham)*
11	0-4-0 Saddle Tank 7¼ in. gauge	J. N. Andrews *(Great Barr, Birmingham)*
12	*Britannia* 2-4-0 3½ in. gauge	D. H. Kininmont *(Wimborne, Dorset)*
13	*Tich* 0-4-0 3½ in. gauge	D. H. Kininmont *(Wimborne, Dorset)*
14	L.N.E.R. Class B1 4-6-0 *Springbok* 5 in. gauge	F. A. Dockray *(Loughborough, Leics.)*
15	Narrow-gauge 4-6-0T 2½ in. gauge	P. E. Stephenson *(Wakefield, Yorks.)*
20	Caledonian 0-6-0T *Rob Roy 32* in. gauge	M. A. C. Foreman
17	G.W.R. *King William III* 3½ in. gauge	D. G. Sutcliffe *(Burnley, Lancs.)*
18	B.R. Class 9F 2-10-0 *Evening Star* 3½ in. gauge	E. F. Holden *(Accrington, Lancs.)*

This Exhibition is certified by the Board of Trade for the purpose of Section 51 (2) of the Patents Act, 1949, and of Section 6 (2) of the Registered Designs Act, 1949.

It is necessary that Exhibitors wishing to avail themselves of the protection afforded should make formal application for the grant of a patent or the registration of a design, as the case may be, not later than six months after the opening of the Exhibition.

AWARDS

The cups and medals will be forwarded to the successful competitors as early as possible after the close of the Exhibition, when names have been engraved and diplomas signed.

PRIZE POOL ALLOCATION

Classes attracting six or more entries will enjoy prizes to the value of 1st £5; 2nd £3; 3rd £1. With over 12 entries 1st £7; 2nd £4; 3rd £2; 4th £1. Classes under six will have 1st and 2nd only, or at the discretion of the judges may be amalgamated with other classes, or given a discretionary award only. Prizes may take the form of Vouchers, Cash, Replica Trophies (for Challenge Trophy winners, or Championship Trophies.

NATIONAL AWARDS

A number of magnificent trophies have been donated in the past for competition in "Model Engineer" Exhibitions. These cups and trophies are awarded on the occasion of M.E. Exhibitions. Winners hold their trophy for one year only.

In some cases additional prizes in the form of vouchers for goods from firms exhibiting at the Exhibition or advertising in the Souvenir Catalogue may also be awarded.

JUDGING

Judging will take place immediately before the Exhibition opens. Printed results should be available by the day following and will be inserted in catalogues obtained at the show, or will be available on demand by visitors.

*SILVER AND BRONZE MEDALS

Offered in all classes, provided the work is considered by the judges to be of medal standard. The medals will be awarded on the quality of individual models, and not on any placing of the entries in order of merit in a class.

*Silver and bronze coloured.

DIPLOMAS

The judges are empowered to award diplomas in recognition of special merit in all classes at their discretion.

CERTIFICATES

Certificates of entry are given to the owner of every model exhibited in the Competition sections.

THE AVELING-BARFORD TROPHY

Presented by the directors of Aveling-Barford Ltd., for annual award to the best working model traction engine, road roller or steam wagon.

THE BOWYER-LOWE CHALLENGE CUP

Donated by Mr. A. E. Bowyer-Lowe, to be awarded for the best example of craftsmanship and design in the Tools and Workshop Appliances class.

THE BRADBURY-WINTER MEMORIAL CHALLENGE CUP

Donated by Mrs. Bradbury-Winter and a number of friends, to be awarded annually, at the discretion of the judges, for the most outstanding example of amateur mechanical craftsmanship.

THE "BRISTOL" CHALLENGE CUP

Donated by the Bristol Aircraft Company. To be awarded annually for the best model of a "Bristol" aircraft.

THE CREBBIN MEMORIAL CUP

Donated by certain friends of the late Mr. J. C. Crebbin. To be awarded for the best entry in the Locomotive, General Engineering and Mechanically-propelled Road Vehicles Classes.

THE H. V. EVANS TROPHY

Donated by the Thames Shiplovers' Society in honour of its founder, Mr. H. V. Evans. To be awarded annually at the discretion of the judges for research and/or presentation of a ship model.

THE EXIDE AND DRYDEX CHALLENGE CUP

Donated by the Directors of Chloride Batteries Ltd., for annual award. To be awarded at the discretion of the judges to the best model incorporating a battery entered in any section.

THE JOHN GRAY MEMORIAL TROPHY

Donated by the family of the late John Gray for the best Class N model by an entrant under 21.

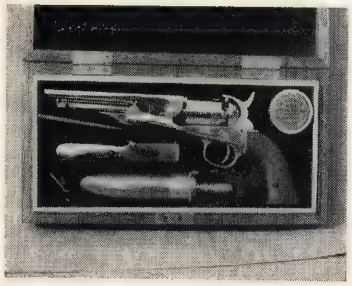
L.B.S.C. MEMORIAL BOWL COMPETITION

A handsome trophy presented by public subscription by admirers of the late L. "Curly" Lawrence, known throughout the world as L.B.S.C. to be of a locomotive of his design, which will be judged on both appearance and performance.

THE MALTBY TROPHY

Donated by Mr. M. Maltby to be open for competition by Ship Model Societies exhibiting at the Model Engineer Exhibition.

Detailed full-size replica of 1861 Colt Pocket Revolver made on Myford lathe, complete with bullet mould, powder flask, by Brian Hutchings of Nottingham.



19	C.R. 2-4-0 express, Connor design, 1870 5 in. gauge	C. R. Amsbury *(Kings Newton, Derbys.)*
20	Caledonian 0-6-0T *Rob Roy* 3½ in. gauge	M. A. C. Foreman *(East Barnet, Herts.)*
21	Schools Class locomotive 3½ in. gauge	R. A. F. Morris *(Harrow, Middx.)*
22	*City of Capetown* 15F Class 3½ in. gauge	R. Etter *(Johannesburg, S.A.)*
23	Contractor's Loco *Tich* 3½ in. gauge	N. Marshall-Potter *(Welwyn Garden City)*

CLASS A1: Locomotives—to any L.B.S.C. design 2½ in. gauge and over

No.	*Description*	*Name and Town*
1	G.W.R. 57xx 0-6-0T *Pansy*	John Phillips *(Ashford, Middx.)*
2	*Princess Marina* L.M.S. mixed traffic 2-6-0 tender loco	S. A. Nightingale *(Tadworth, Surrey)*
3	L.B.S.C.'s *Titfield Thunderbolt* 5 in. gauge Lion	R. S. Ekins *(Northampton)*

CLASS B: Locomotives. In gauge 1 and 0

No.	*Description*	*Name and Town*
1	G.W.R. broad gauge locomotive *Vulcan* 7 mm.	P. R. Horton *(Longhope, Glos.)*
2	4-6-0 MT locomotive (steam power) 7 mm.	R. Farrar *(Basingstoke, Hants.)*
3	Lartigue Monorail locomotive and coaches 16 mm.	A. S. Garner *(Southfields, London)*
4	L.S.W.R. Adams 4-4-0 express passenger 7 mm.	J. Brierley *(Hove, Sussex)*
5	L.S.W.R. Adams Radial Tank No. 488 7 mm.	J. Brierley *(Hove, Sussex)*
6	G.E.R. Class B12 4-6-0 locomotive 7 mm.	J. S. Bremner *(Southwick, Sussex)*
7	Stanier Duchess type Pacific 10 mm.	P. E. L. Whittle *(Mountsorrel, Leics.)*

CLASS BA: Locomotives. In gauges smaller than 0

No.	*Description*	*Name and Town*
1	G.W.R. Pannier tank loco. No. 8729	R. J. Gillmor *(Acton, W3 0JD)*
2	L.S.W.R. class T1 loco	R. H. Dyer *(Warwick)*

CLASS C: Rolling Stock and Accessories. Gauge 1 and 0 or larger

No.	*Description*	*Name and Town*
1	Metropolitan 5 in. gauge "Dreadnought" coaches (2)	E. A. Allchin *(New Romney, Kent)*
2	3 in. scale Slab Trolley	Ann C. Hatherill (Mrs.) (Croydon, Surrey)
3	10 ton Merchandise wagon 3½ in. gauge	A. Howarth *(Lostock Hall, Preston)*

CLASS CA: Rolling Stock and Accessories. Gauges smaller than 0

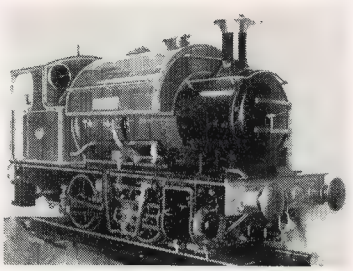
No.	*Description*	*Name and Town*
1	Three P.O. wagons 3 mm. scale	P. A. Hastie *(Ruislip, Middx.)*
2	G.W.R. Milk Van Siphon J 4 mm. scale	R. A. Middleton *(Reigate, Surrey)*
3	G.W.R. Milk Van Siphon C 4 mm. scale	R. J. Gillmor *(Acton, London)*
4	L.M.S. 12T Box Van (vacuum brake) 4 mm. scale	R. J. Gillmor *(Acton, London)*
5	Three G.W.R. passenger vehicles c. 1900, 4 mm. (EM)	J. Whittaker *(Rochdale, Lancs.)*

CLASS D: Steam and Motor Ships of any period. (Non working)

No.	Description	Name and Town
1	CA Class Destroyer H.M.S. *Cavalier* 1/192 scale	E. R. Dyke *(Wivenhoe, Essex)*
2	Leander Class G.P. Frigate H.M.S. *Danae* 1/192 scale	E. R. Dyke *(Wivenhoe, Essex)*
3	*Ton 12* crabber 1/25 scale	K. Leebrooke *(Catford, London)*
4	F.P.B. *Brave Borderer* 1/32 scale	A. Rice *(Thetford, Norfolk)*
5	Cruiser H.M.S. *Dido* 1/192 scale	L. Kirby *(West Yorkshire)*
6	R.M.S. *Titanic* 1/350 scale	P. Thompson *(North Shields)*
7	Motor ship *Randfontein*	L. G. Thick *(Ipswich, Suffolk)*

CLASS E: Power Driven Boat Models (complete with power plant). Scale or Freelance.

No.	Description	Name and Town
1	*Ton 12* crabber 1/25 scale	P. Harrison *(Chingford, London)*
2	*Moonraker* series D 1/10.5 scale	K. Heaton *(Edmonton, London)*
3	Flower Class corvette *Montbretia* 1/384 scale	A. M. Hall *(Orpington, Kent)*
4	F.P.B. *Brave Borderer* 1/32 scale	D. A. W. Kemp *(Rayleigh, Essex)*
5	—	—
6	Trinity House Vessel *Patricia* 1/96 scale	L. Crossley *(Heworth, York)*
7	Freelance Tug	T. J. Trotman *(Acton, London)*
8	*Avenger* offshore power boat 1/6 scale	R. Sawell *(London W14)*
9	R.M.S. *Mauretania* 1/240 scale	L. H. King *(Hayling Island)*
10	Tug *Cervia* 1/48 scale	A. Rice *(Thetford, Norfolk)*
11	Modified *Speranza* motor yacht 1/12 scale	C. Jenner *(Oxted, Surrey)*
12	Fairey *Huntsman* 1/7 scale	L. Fastier *(Wimbledon Park SW18)*
13	Freelance fast launch	P. J. Dickinson *(Huddersfield, Yorks.)*
14	C2 cargo ship *American Scout*	P. M. Crate *(Sanderstead, Surrey)*
15	Barnett-Stromness lifeboat 1/36 scale	W. A. Beck *(Crawley, Sussex)*
16	Tug *Zwarte Zee* 1/100 scale	E. Smit *(Tring, Herts.)*
17	Tug *Cervia*	F. F. Few *(Hatfield, Herts.)*
18	Semi scale Leander Class Frigate	G. J. Feaver *(Reading, Berks.)*
19	Freelance Clyde puffer *Lady L* 1/32 scale	R. Cattle *(Thornton Heath, Surrey)*
20	Motor launch *Wilwyn* 1/16 scale	A. J. Staples *(Borehamwood, Herts.)*
21	R.A.F. High Speed Launch 1/20 scale	G. A. Thompson *(Finchley, London)*
22	Clyde Paddle Steamer 1/24 scale	N. C. Huggett *(Ruislip, Middx.)*
23	Flower Class corvette 1/84 scale	G. Ashdown *(New Southgate, London)*
24	Coal-fired steam tug 1/24 scale	R. G. Turner *(Bournemouth)*
25	Clyde Puffer 1/24 scale	R. Johnson *(Hendon, NW4 2JP)*



This fine 0-4-0 Saddle Tank in 7¼ in. gauge by J. N. Andrews of Birmingham can be driven on a ground-level track and heralds an increasing interest in what must be the largest gauge normally built in the home workshop.

J. N. MASKELYNE MEMORIAL TROPHY

To be awarded, at the discretion of the judges, for the model locomotive, in any scale, which does most to promote fidelity of design.

THE MAZE CHALLENGE CUP

Donated by Sir Frederick Maze, K.C.M.G., K.B.E., to be awarded annually for the best model of a sailing ship (pre-1820) or of an Oriental sailing craft of any period.

THE MODEL RAILWAYS BOWL

Presented by the proprietors of "Model Railways" for the best small gauge railway exhibit.

NEW ZEALAND CUP

Presented by the Model Societies of New Zealand for the best model of a locomotive based on a design by L.B.S.C.

THE U.S.S.R. CENTRAL MARINE CLUB CHALLENGE CUP

Donated by the Council of Central Marine Club (U.S.S.R.). To be awarded annually to the Club whose exhibit represents the best achievement in marine model engineering.

EDGAR WESTBURY MEMORIAL CHALLENGE TROPHY

Presented by the Society of Model & Experimental Engineers to be awarded at the discretion of the judges annually for originality and soundness of design in any type of prime mover, working plant in a marine craft, or fidelity to prototype of a working model i.c. engine.

THE H. C. WHEAT CHALLENGE CUP

The H. C. Wheat Challenge Cup presented by his son in memory of H. C. Wheat 1877-1948 to be awarded annually for the best "O" Gauge Locomotive exhibited.

THE WILLIS CHALLENGE CUP

Donated by Mrs. Willis, in memory of her husband, to be awarded annually for the best exhibit in the Hydroplane and Speedboat Section.

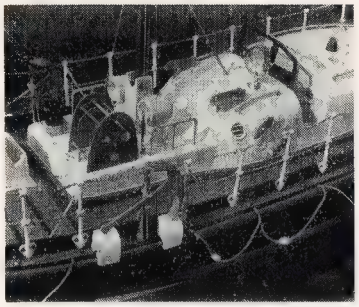
CHAMPIONSHIP CUPS

In addition to challenge trophies a number of cups or other trophies are offered to become the permanent property of the winners. Class trophies are offered as follows for the best:

I Locomotive
II Steam or Motor Vessel
III Sailing Ship or Yacht
IV Ship Miniature
V Mechanically propelled Road Vehicle
VI General Engineering Exhibit
VII Aircraft Model

STUDENTS' CUP

Awarded for any piece of amateur craftsmanship made collectively or individually by a class or member of a class of any school or technical college, or by a full time engineering apprentice. The exhibitor (or exhibitors) must be under the age of 18 on 31 December, 1975.



Detail of Stromness-Barnett Lifeboat William Becks 40in l.o.a. model powered by two Decaperms.

SCHOOLS' COMPETITION

For boys under 16 who are still at school. Entries can be made individually or collectively provided that the competitors are under 16 on 31 December, 1975.

DUKE OF EDINBURGH CHALLENGE TROPHY

1 A very handsome silver tankard, this trophy shall be known as The Duke of Edinburgh Challenge Trophy, and shall be awarded to the winner of the Championship Award at The Model Engineer Exhibition.

2 The trophy shall remain at all times the property of Model & Allied Publications Ltd.

3 The name of the winner and the date of the year in which the award is made shall be engraved on the Trophy, which may remain, at the discretion of Model & Allied Publications Ltd., in his possession until required for renovation and display at the following Model Engineer Exhibition.

The winner shall be presented with a suitably inscribed tankard for his permanent retention.

4 Any piece of model engineering work shall be eligible for the Championship Award after it has been awarded, at The Model Engineer Exhibition, a Championship Cup, Gold or Silver Medal or one of the Cups donated by Friends of the Exhibition.

5 No model may be entered more than once.

6 Entry, which shall be free, shall be made on the official Competition Entry Form, Competitors must state on the Entry Form:

(a) that exhibits are their own bonafide work;
(b) any parts or kits which were purchased or were not the outcome of their own work;
(c) that the model has not been structurally altered since winning the qualifying award;
(d) the origin of design.

7 Model & Allied Publications Ltd., may, at their sole discretion, vary the Conditions of Entry without notice.

GENERAL CONDITIONS OF ENTRY

1 Each entry shall be made on the official form and every question must be answered. Be sure to include the estimated value of your model.
2 All entry forms shall be accompanied by a remittance for the appropriate entry fee.
3 The entrance fee shall be 30p for seniors and 15p for under 16's.
4 A junior shall mean a person under 16 years of age on 31 December, 1975.
5 No exhibit which has previously won a bronze medal or higher award at any of the exhibitions promoted by this company shall be accepted for these Competitions. No model may be entered in more than one class.
6 No entry shall be accepted from a professional model maker.
7 The decisions of the judges shall be final.
8 Competitors shall state on the entry form:
(a) That exhibits are their own work and property.

26	Ex-Weston-super-Mare lifeboat 1/12 scale	G. Drew *(Hucclecote, Gloucester)*
27	Steam yacht *Mary Dean* (rebuilt) 7/32 in. scale	A. R. Falconer *(Catford SE6 3BA)*

CLASS F: Sailing Ships of any period. (Non working)

No.	*Description*	*Name and Town*
1	12-gun brig 1/48 scale	M. C. Puttock *(Sunbury-on-Thames)*
2	Training Ship *Danmark*	E. J. Capon *(Erith, Kent)*
3	Tudor ship *Lion*, c. 1587 1/77 scale	L. A. Kimm *(Hoddesdon, Herts.)*
4	*Santa Maria*	G. W. Nash *(Harrow, Middx.)*
5	American frigate *Bon Homme Richard* 1799	W. Laidler *(Willenhall, W. Midlands)*
6	H.M. Gunboat *Foxhound* 1/48 scale	D. A. Taylor *(Newport, Gwent)*
7	Lowestoft drifter *Strive* 1/48 scale	D. A. Taylor *(Newport, Gwent)*
8	*Santa Maria* 1492 1/50 scale	P. Jackson *(Bromley, Kent)*
9	Chinese War Junk 1/48 scale	T. W. Dickey *(Newtownabbey, Co. Antrim)*
10	Egyptian boat, 5th Dynasty, c. 2600 B.C. 1/12.5 scale	D. W. J. Burchell *(Sutton Coldfield)*
11	*Golden Hind*	M. Edden *(Sutton Coldfield)*
12	Sir Richard Grenville's *Revenge*	A. A. Goldie *(Brighton, BN4 4LB)*
13	Blackwell frigate *True Britain* 1/96 scale	K. A. Codling *(London, NW8 7RP)*
14	Grand Banks Schooner *Bluenose*	K. Gardner *(Pinner, Middx.)*
15	Bomb ketch *Granado*	J. B. Walton *(Portbury, Bristol)*

CLASS G: Working Yachts and Sailing Ships

No.	*Description*	*Name and Town*
1	Thames Sailing Barge *Kathleen* 1/24 scale	M. T. Davey *(Hove, Sussex)*
2	Stuart Yacht 1661 1/24 scale	J. Blight *(Croydon, Surrey)*
3	Small functional yacht	V. J. Relle *(London W14)*
4	18th Century Chinese trading junk 1/24 scale	J. D. Bloom *(Colchester, Essex)*
5	*Le Sphinx* French Paddle Steamer 1820–30 1/48 scale	T. E. J. Manning *(Longfield, Kent)*

CLASS H: Hydroplanes and Speedboats

No.	*Description*	*Name and Town*
1	*Bluebird*, rocket powered speed boat	P. W. Evans *(Bolton, Lancs.)*
2	'A' class Hydroplane *Crazy Rhythm 5*	A. Rayman *(Beckenham, Kent)*

CLASS I: Miniatures. Length of hull not to exceed: 9 in. for $\frac{1}{8}$ in. to 1 ft. scale or larger; 10 in. for 1/16 in. scale; 12 in. for 1/12 in. scale; 15 in. for 1/32 in. scale. No limit for smaller scales

No.	*Description*	*Name and Town*
1	U.S.S. *Washington* Revenue cutter, brig 1837 1/600 scale	D. Hunnisett *(Aylesbury, Bucks.)*
2	*Royal Katherine* 1664 84 gun English ship 1/600 scale	D. Hunnisett *(Aylesbury, Bucks.)*
3	H.M.S. *Tiger*—Jutland 1916 1/1200 scale	G. F. S. Winrow *(Birkenhead, L42 4NT)*
4	English ship circa 1426 1/384 scale	J. A. Evans *(Thornton Heath, Surrey)*

5	English Ship 13th Century 1/600 scale	E. P. Heriz-Smith *(Tunbridge Wells)*
6	17th Century Shipyard scene 1/192 scale	E. P. Heriz-Smith *(Tunbridge Wells)*
7	*Mayflower* 1620	P. Jackson *(Bromley, Kent)*
8	H.M.S. *Endeavour* 1768	P. Jackson *(Bromley, Kent)*

CLASS J: General Engineering Models (including Stationary and Marine Engines) (working models)

No.	*Description*	*Name and Town*
1	Stuart Turner Beam Engine on plinth	F. A. Harris *(Milton Keynes)*
2	Triple Expansion Marine Engine 1/16 scale	A. G. Hann *(Cornwall)*
3	Stuart No. 5A Engine	T. W. Millward *(Prestbury, Cheshire)*
4	Manhattan Compound Condensing Steam Engine 1/24 scale	E. D. Jakins *(Kettering, Northants)*
5	Twin Cylinder Marine Steam Engine 1/12 scale	T. W. Pinnock *(London N20)*
6	Horizontal Hot Air Engine 1¼ in. bore 2 in. stroke	B. R. Pople *(Long Eaton, Notts.)*
7	Horizontal Hot Air Engine 1⅞ in. bore 3 in. stroke	B. R. Pople *(Long Eaton, Notts.)*
8	M.E. Beam Engine 1/12 scale	P. Thompson *(Sheffield, S11 9FN)*
9	Steam Boiler & Steam Feedpump 12 lb./hr., 100 lb. sq. in.	T. D. Walshaw *(Nr. Kendal, Westmorland)*
10	Compound Steam Engine	T. D. Walshaw *(Nr. Kendal, Westmorland)*
11	Gas-fired Boiler	T. D. Walshaw *(Nr. Kendal, Westmorland)*
12	M. E. Beam Engine	Dr. J. Freeborn *(Merton Park, SW19)*
13	Electrical Power Plant 1/12 scale	W. U. Hancock *(Haslemere, Surrey)*
14	Marine Steam Power Unit	B. G. Rose *(Barton-le-Cley)*
15	12 h.p. Sanderson Beam Engine with Governor and Boiler Feed Pump. Mid 1800 1/12 scale	L. H. Norris *(Merton Park, SW19)*
16	Steam Pump for 5 in. gauge locomotive	F. R. M. Lowne *(Sundridge Park, Bromley)*
17	12 h.p. Beam Engine by Sanderson	J. B. Cunningham *(Burlesdon, Hants.)*

CLASS K: Internal Combustion Engines (working models)

No.	*Description*	*Name and Town*
1	Freelance Internal Combustion Engine	G. E. Wolfe *(Purley, Surrey)*
2	9 Cylinder Rotary Aero Engine 1/5 scale	A. Walshaw *(Nr. Kendal, Westmorland)*

CLASS L: Mechanically Propelled Road Vehicles (including tractors) (working models)

No.	*Description*	*Name and Town*
1	Allchin *Royal Chester* 1½ in. scale	R. Houlder *(Crowborough, Sussex)*
2	*Minnie* Traction Engine 1 in. scale	W. J. Silvester *(Oxted, Surrey)*
3	Burrell Scenic Showman's Road Loco No. 3909 *Winston Churchill*	Cherry Hinds (Miss) *(Malvern, Worcs.)*
4	Allchin *Royal Chester* 1½ in. scale	T. Savage *(Leyton, London)*
5	*Minnie* Traction Engine 1 in. scale	B. R. Owens *(Thirsk, N. Yorks.)*

(b) Any parts or kits which were purchased or were not the outcome of their own work.
(c) The origin of the design.

9 Models will be insured for the period during which they are at the Exhibition and in transit to and from the Exhibition, provided they are adequately packed and the instructions regarding their dispatch are correctly observed.
10 Model & Allied Publications Ltd., reserve the right to refuse any entry or model on arrival at the Exhibition and shall not be required to furnish any reason for doing so.
11 Model & Allied Publications Ltd., reserve the exclusive rights to describe and photograph any models entered for competition or display and to make use of any such photograph or descriptions in any way they may think fit.
12 Competitors will be issued with a free non-transferable Competitor's Pass to the Hall during the Exhibition.

COLLECTION

Models may be removed from the Hall between 7 p.m. and 9 p.m. on Saturday, 10 January; 10 a.m. and 4 p.m. on Sunday, 11 January, 1976.

ALL models MUST be removed by 10 a.m. on Monday, 12 January, 1976.

Competitors will be provided with a card authorising collection which MUST be presented.

Models cannot be reclaimed before the end of the Exhibition.

TRADE EXHIBITORS

STUDIOLITH LTD.

Stand 1

Studiolith Ltd. again comes to the Seymour Hall exhibiting the range of correctly scaled model railway components for 4 mm./1 ft. scale marketed under the name 'Protofour' R. This set of standards, which is considered to be the closest to prototype in 4 mm. scale is a complete system in itself, and examples of tools, gauges, templates and track materials for the construction of realistic track to the correct gauge of 18.83 mm. will be shown.

A number of components can be used by anyone in 4 mm. scale. These include the correct nickel-silver Bullhead Rail, Ballast, Baseboard Joiners and the scale 3-link Couplings with the intriguing Magnetic Shunters' Pole.

N. MOLE & CO. (MACHINE TOOLS) LTD.

Stands 2, 3 & 4

N. Mole & Co. (Machine Tools) Ltd. will have on display this year a Mk. II version of the very popular "Amolco" ½" capacity drilling machine, and for the first time the "Amolco" milling attachment. This is a 4-speed unit, suitable for mounting onto the bed of Myford or Boxford lathes, and with small modifications to the base of the attachment it could be mounted onto a number of other makes of lathes.

For the first time at this exhibition, the full range of Emcomat, Maximat and Unimat lathes will be on show, together with the Mentor-Mill bench or cabinet type universal milling machine. For those who are interested in the purchase of a lathe or milling machine we would recommend that you give this range your careful consideration.

Certain models of Myford and Boxford lathes will also be on view with a wide range of accessories which are available for these machines.

There will be a display of measuring equipment, rotary tables, machine vices etc., and so we would suggest that you make a point of visiting this stand, as we feel sure that you will see many items of workshop equipment that will be of interest.

B. R. PERRIS MACHINE TOOLS LTD.

Stand 5

If the need exists for a lathe of compact dimensions which can be made portable by mounting on a baseboard, will handle all types of machining jobs from large size cast iron wheels and discs to small intricate parts in steel, brass, alloy and plastic, cut teeth in gears, mill slots, keyways, squares and hexagonal shapes, flycut and bore oversize jobs by mounting on the tee slotted cross-slide Screwcut internal and external threads all with the metal removal performance of a larger machine. These needs are met in the Perris PL90.

The range of accessories increase the usefulness and versatility of this fine tool and enable many other operations to be carried out such as milling, sawing, threading, drilling, gearcutting etc.

We also produce a Milling machine, a small bench drill and, of course, the Perris "Jigmaster" saw.

Constructed on sound principles using castings for all major components, the slides are machined to close tolerances and hand fitted to give accuracy in working, gib strips are provided to allow adjustments for wear in all moving slides. Interchangeable limits are used on all parts.

KENNETH JOHNS LTD.

Stand 6

If you read an M.A.P. publication then something is sure to interest you on Stand No. 6.

Mr. H. Ilett, Technical Demonstrator of the U.K. Concessionaires will be giving regular demonstrations of brazing with SIEVERT Bottled Gas Equipment, a name long respected by model engineers.

Aeromodellers and Model Boat Builders can see how easy it is to build their own stunt tanks and purpose designed fuel tanks, and we have no hesitation in recommending these appliances to the Jewellery Craftworker—jewellers in Hatton Garden use it!

Modellers should see how easily plastic can be shaped when heated in the hot air produced by the Plastic Welding Torch.

On Friday 2nd January, Mr. A. C. Perryman, Chairman Worthing and District Society of Model Engineers will be with us—if you are a beginner, do not miss this chance to talk over your problems with an "old hand".

We also have the services of Mrs. E. Gallop at work on beautiful three-dimensional Wire Sculpture on Monday 5th January 1976.

Last but not least, take advantage of the special exhibition discounts to get a set of equipment that will give you hours of pleasure (and profit too perhaps).

Electronics enthusiasts should see the display of LINDSTROM Pliers and Nippers—space prohibits a full range of tools, but pick up a leaflet and see how comprehensive the range is.

MYFORD LTD.

Stands 7 & 8

MYFORD LIMITED have been manufacturing lathes for the model engineer for over forty years, though almost from the inception a certain proportion of the machines have been used by industry both for production and experimental purposes. As the years have passed, the proportion so used has increased appreciably.

6	Freelance Traction Engine	D. F. Millard *(Kingswood, Bristol)*
7	Modified *Minnie* Traction Engine	F. F. Few *(Hatfield, Herts.)*
8	Aveling & Porter Type OA Tandem Steam Roller	R. K. Drury *(Goole, N. Humberside)*
9	Steam Wagon	R. H. Dyer *(Warwick)*
10	Showman's Engine 1 in. scale	H. Richardson *(New Malden, Surrey)*
11	*Minnie* Traction Engine	D. E. Matthews *(Swindon, Wilts.)*
12	Wallis & Steevens Advance Type Roller 2 in. scale	S. Jackson *(Manchester, M25 7RB)*
13	Allchin *Royal Chester* 1½ in. scale	E. D. Lowndes *(Nr. Altrincham, Ches.)*
14	Fowler Compound Showman's Road Locomotive 2 in. scale	R. G. Burton *(Yeovil, Somerset)*
15	Foden C Type Tractor 4½ in. scale	L. N. Smith *(Wickford, Essex)*

CLASS MA: Diorama. Competition for Diorama composition for any type or size of figures or scenery to be of Military, Naval or Air Force character

No.	*Description*	*Name and Town*
1	Sgt. Ewart at Waterloo 54 mm. scale	R. C. Webb *(Shaftesbury, Dorset)*
2	Remembering 1/32 scale	C. Miners *(Cheltenham, Glos.)*
3	Right of the Line ('39-'45) 1/35 scale	C. Miners *(Cheltenham, Glos.)*
4	British Dragoon attack 1815 54 mm. scale	P. W. Hawkes *(Orpington, Kent)*
5	Chasseur & Guard Scout 1815 54 mm. scale	P. W. Hawkes *(Orpington, Kent)*
6	Field Hospital, France, 1917 54 mm. scale	K. Beckhurst *(London SE11)*
7	Drinks All Round (1809) 54 mm. scale	J. Laskey *(Warlingham, Surrey)*
8	Belgian Dragoon, Hesse-Darmstadt Infantryman (1813)	P. M. Cox *(Ilford, Essex)*
9	Bavarian & Cleve-Berg Grenadiers (1812)	P. M. Cox *(Ilford, Essex)*
10	Dice Game (1812) 54 mm. scale	P. M. Cox *(Ilford, Essex)*
11	Mountain artillery, Afghanistan (1879) 54 mm. scale	C. Stubbings *(Basingstoke, Hants.)*
12	Who Dares, Wins ('39-'45) 54 mm. scale	C. Stubbings *(Basingstoke, Hants.)*
13	Lorries on road 4 mm. scale	P. B. Champion *(Reading, Berks.)*
14	Stuart Tank & G.I.s ('39-'45) 1/35 scale	K. P. Lyles *(Stanmore, Middx.)*
15	Advance on Krukovo Station 1/35 scale	A. J. Dowell *(Finsbury Park, N4)*
16	Kettenkrad 1/9 scale	A. Disdale *(Wembley, Middx.)*
17	Sitzkrieg! 1/35 scale	P. Charles *(Chipping Norton, Oxon.)*
18	Desolation Boulevard 1/35 scale	P. Jacques *(N. Wembley, Middx.)*
19	Retreat from Moscow 1/32 scale	S. Ellis *(Henley-on-Thames)*
20	Single Combat 1/32 scale	S. Ellis *(Henley-on-Thames)*
21	Rorke's Drift 1/32 scale	S. Ellis *(Henley-on-Thames)*
22	Tank & figures 1/32 scale	M. Kelsey *(Farnham, Surrey)*
23	Reconnaissance 1945 1/32 scale	N. Lyon *(W. Wimbledon)*
24	Panther in undergrowth 1/35 scale	A. Bain *(Higham, Kent)*
25	Peiper & Scout Team 1/35 scale	A. Bain *(Higham, Kent)*

26	The Old Guard, Waterloo 40 mm. scale	R. Brown *(Cambridge)*
27	American Express? ('39-'45) 1/35 scale	M. Steedman *(Chelmsford, Essex)*
28	French Napoleonic Field Forge 54 mm. scale	A. L. Hope *(Rochester, Kent)*
29	Taking Ten—Kent 1939 1/76 scale	J. Firth *(London NW3)*
30	Time for a drink 54 mm. scale	J. Day *(Aveley, Essex)*
31	Street Fighting, France 1944 1/12 scale	R. Scott *(Feltham, Middx.)*
32	11th Lancers at Balaclava (1854) 54 mm. scale	R. J. Smith *(Leighton Buzzard, Beds.)*
33	From the Planet of the Apes 54 mm. scale	R. J. Smith *(Leighton Buzzard, Beds.)*
34	Isandhlwana 22 Jan. 1789 54 mm. scale	R. J. Smith *(Leighton Buzzard, Beds.)*
35	Royal Marines Band 2 in. scale	D. R. C. E. Hamilton *(Kingston-upon-Thames)*
36	Hanomog & figures 1/35 scale	R. Parker *(Colchester, Essex)*
37	Eighth Army 1/32 scale	P. Shirley *(Wickford, Essex)*
38	Soiree De L'Empereur 54 mm.	P. O. Stearns *(London W1)*
39	Hey, My Dinner! 1/35 scale	F. Verlinden *(Emblem, Belgium)*
40	Surprise Attack 1/35 scale	F. Verlinden *(Emblem, Belgium)*
41	Leichter Panzerspahwagen 1/13 scale	F. Verlinden *(Emblem, Belgium)*
42	The Ardennes 1944	F. Verlinden *(Emblem, Belgium)*
43	Hanging up the washing on the Siegfried Line 1/35 scale	L. Kemp *(Aldershot, Hants.)*
44	Everyone Loves a Parade 1/72 scale	Claire Crook (Mrs.) *(Ashford, Kent)*
45	General Kellerman regains the French Lines 54 mm scale	S. R. Box *(Haywards Heath, Sussex)*
46	Waiting for Waterloo 54 mm. scale	P. Skinner *(Tunbridge Wells, Kent)*
47	Battle Stations 54 mm. scale	P. Skinner *(Tunbridge Wells, Kent)*
48	Vamanos	Margaret Reynolds *(Putney, London)*
49	Home for Tea 1/72 scale	J. Penrose *(Harpenden, Herts.)*
50	British Grant M3 1/32 scale	R. Parker *(Colchester, Essex)*
51	After the Battle 1/35 scale	A. Ormerod *(Somerset)*
52	King Tiger & Kubelwagen 1/35 scale	R. Parker *(Colchester, Essex)*
53	Polish Lancer French Imperial 54 mm. scale	J. W. Morrell *(London W6)*
54	Checkpoint at Troodos (1957) 54 mm. scale	P. McDermott *(Peckham, London)*
55	Tres de Mayo, after Goya 1/72 scale	D. R. Lewin *(Beckenham, Kent)*
56	French Army in Italy (1797) 1/32 scale	D. R. Lewin *(Beckenham, Kent)*
57	Troubled Waters 1/35 scale	T. Kowalczyk *(Rugby, Warks.)*
58	Field Forge 1/35 scale	H. Ranger *(Guildford, Surrey)*
59	In Honour Bound	S. D. Raine *(Maidenhead, Berks.)*
60	For Want of a Nail	S. Jacques *(Edmonton, N18)*
61	A Brief Respite 54 mm. scale	J. C. Gates *(Cobham, Surrey)*
62	End of the Road—Berlin 1945 1/35 scale	N. Cunningham *(London WC1)*
63	Prussia 1756 30 mm. scale	D. M. L. Jones *(Palmers Green, London)*
64	Mexico 1843 54 mm. scale	D. M. L. Jones *(Palmers Green, London)*

The quality of the machines, the degree of interchangeability, resulting in the ease with which replacement parts may be fitted and the very wide range of additional equipment which covers not only the conventional centre lathe accessories but also milling equipment such as vertical slides, milling arbors, dividing attachments and so on have all contributed to the world-wide popularity of MYFORD lathes. So far as the ML7 and Super 7 lathes are concerned, there is also a range of purely production equipment such as lever operated collet chuck, lever operated and screw operated part-off slides and six station turrets.

Particularly so far as quality is concerned, the MYFORD lathes have gained appreciably from the fact that they are manufactured in the same plant alongside the range of precision cylindrical grinding machines.

The exhibits will include the ML7, Super 7 and ML10 metal turning lathes, plus a comprehensive range of additional equipment for them and an ML8 Woodworking Lathe with some equipment for it.

Demonstrations of the metal turning lathes will be taking place during the exhibition.

HISTOREX

Stand 9

This is the eighth consecutive year that Historex have exhibited at the Model Engineer Exhibition, and we have gone from strength to strength since 1969, when we were the first company to show model soldiers.

Apart from the fact that we have on show this year the most superior collection of Historex painted figures in the world, we also have the pleasure of representing the well known makes of "Poste Militaire" and "Series 77".

Our sales staff will be happy to show you flat figures from Scholtz of Berlin, and the range of Superior figures from the U.S.A.; books dealing with uniforms and modelling aids in the form of paint brushes, tools and the Historex Pyrogravure. Well known modellers Max Longhurst and Graham Brown will be demonstrating, on certain days, both the animation of Historex figures and painting techniques. Painted flat figures will be on display from the talented hands of Ken Bastian and Jacob Ros.

We, of Historex Agents, extend a warm welcome to all customers, new and old, and in the hope that we will have items to interest everyone.

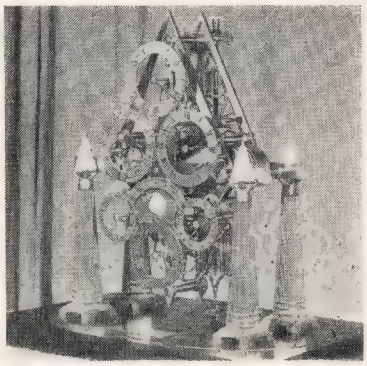
THE NEW MODEL ARMY LTD.

Stand 10

East London's Leading Stockists of Military Figures and Wargames accessories present a cross section of their range of kits, models and figures with the following exclusive items. A full range of 25 mm. figures from Lamming, including their delightful medievals and Byzantines.

For budding admirals we offer the products of Navwar Productions Ltd., from the first rates and

Fantastic astronomical clock with gravity escapement showing hours, minutes, seconds, day, date and month to entrant Brian Elliott's own design and entirely his own work



frigates of fighting sail in 1/1200 scale through the emerging iron-clads of the American Civil War and Pre-Dreadnought eras to World Wars one and two all in 1/1300 scale, together with the 1/1200 scale warships and merchants vessels from Fleetline and Ensign.

For figure collectors in larger scales we show the full range from Barry Minot in 30 mm., 54 mm. and 90 mm., together with the well known Rose Figures in 54 mm. from the Splendours of Ancient Egypt, to the modern British Guardsman, plus plastic kits and scenic accessories, dice, rules, etc., etc. So don't forget to visit Stand No. 10, the one run by Military Modellers for Military Modellers and let us see if we can help you in pursuit of the hobby we all share and enjoy.

STOP PRESS

We shall have also as an exclusive introduction at the Exhibition the new line of 54 mm. metal figures by Eagle Miniatures. Don't miss this exciting new collection of unusual subjects like Georges Guynemer the French air ace. A foreign legionnaire of 1900 in Nicaragua 1928 or Gurkha Rifles of 1880 etc.

NEW HOPE DESIGN

Stands 11 & 14

This year's display again features a selection of the many items available from the Company. The 54 mm. figures in the Old Guard range are an essential element of the total range and the latest figures will be on show. These include several new additions by Roger Saunders and Malcolm Dawson, together with work by Charles Stadden, Andrew Chernak and other sculptors.

The GHQ Micro-Armour range is full represented. Generally agreed to be the brand leader in micro-armour, GHQ now offers a superior range of 25 mm. wargame figures and 1:1200 scale ships. Both of these lines maintain the GHQ reputation for exacting detail and high quality casting.

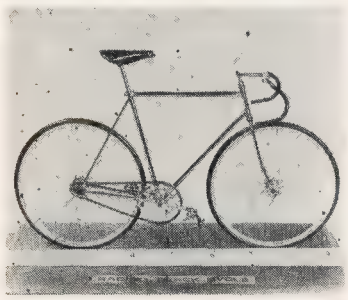
For the railway enthusiast, the Branchline series of railway figures in 4 mm. and 7 mm. scale continues to expand. Some of the later figures have been created by Roslyn Young who is the newest member of the company's resident design team. Railway modellers will also be able to see some exciting new developments in lineside accessories.

The specialist 54 mm. figures from Deauville and Lotus have increased in scope. A complete range of the figures available will be on show.

The specialist collector and painter will find a complete range of Campaign Colours on the New Hope Design stand. The 36 colours in the range are designed to suit the more serious requirements of the collector. Skilful blending and matching is made easy by the fact that these oil-bound poster paints are especially formulated for miniature figures.

Visitors will also be able to see a selected range of items made entirely in English pewter. Burnished and antiqued, this range covers wildlife and replicas as well as more conventional pieces.

Very difficult job to tackle! One eighth scale Carlton Racing Track Cycle some 9in long, by Alan Matravers of Shalford.



65 "Thank God I have done my duty" M. Hole *(Carlisle, Cumbria)*
66 Imperial Deserter, Russia 1812 M. Hole *(Carlisle, Cumbria)*
67 Polish Sleigh, 18th Century 1/32 scale D. M. Catley *(Reigate, Surrey)*
68 Guillotine, 1793 1/32 scale D. M. Catley *(Reigate, Surrey)*
69 Churchill Crocodile France 1944 1/76 scale A. T. Bradford *(New Barnet, Herts.)*
70 8th Army on Patrol 1/35 scale T. Sebborn *(Basingstoke, Hants.)*
71 Dying Alone 54 mm. scale T. Sebborn *(Basingstoke, Hants.)*
72 Naval Brigade Officer Brings News 54 mm. scale T. Sebborn *(Basingstoke, Hants.)*
73 Spanish Conquistadors 54 mm. scale T. Lewis *(Claygate, Surrey)*
74 Unexpected Aid 1/35 scale G. C. Hardy *(Epsom, Surrey)*
75 Time for a Brew-up 1/35 scale R. J. Dumas *(Portslade, Sussex)*
76 Round the Clock 54 mm. scale N. Chandler *(Muswell Hill, London)*
77 Mounted Napoleonic Soldiers in Battle 54 mm. scale J. A. Bradshaw *(Linton, Cambs.)*
78 Saving his Bunkie N. Abbey *(Chesterfield, Derbys.)*
79 Stand of 27th Foot at Waterloo 54 mm. scale P. Barnett *(Isle of Wight)*
80 The Men of Quetzalcoatl 54 mm. scale D. Harvey *(Portsmouth, Hants.)*
81 Samurai 54 mm. scale S. D. Lewin *(Weybridge, Surrey)*
82 Normans & Saxons, 1066 25 mm. scale S. D. Lewin *(Weybridge, Surrey)*
83 When Knights Were Bold 25 mm. scale S. D. Lewin *(Weybridge, Surrey)*
84 Wu Ti Chinese Chariot & Crew 25 mm scale S. D. Lewin *(Weybridge, Surrey)*
85 Battle Front 1/35 scale D. J. Wright *(Ashbourne, Derbys.)*
86 Light Resistance 54 mm. scale T. J. Whiting *(Barking, Essex)*
87 Gun Team, 1815 54 mm. scale T. J. Whiting *(Barking, Essex)*
88 Poniatowski Guides, 1808-13 M. F. Hogben *(Grays, Essex)*
89 Border Incident 1/35 scale M. Pandeli *(London, N16)*
90 Survival Chances 1/35 scale M. Pandeli *(London, N16)*
91 German Vehicles & Troops 1/35 scale P. V. Wakefield *(S. Glamorgan)*
92 A Breach in Communications 1/48 scale D. Barnard *(Colchester, Essex)*
93 Last Stand of the Old Guard 30 mm. scale K. McGlynn *(Weston-super-Mare)*
94 Rommel's Armoured Command Vehicle 1/32 scale P. Graham *(Anerly, SE20)*
95 Trekking Home 54 mm. scale A. T. Kettle *(Eastwood, Notts.)*
96 Mishaps to Scots Greys at Klippan 54 mm. scale A. T. Kettle *(Eastwood, Notts.)*
97 11th Hussars, 1898 54 mm. scale S. Kemp *(Morden, Surrey)*
98 English Civil War Royalists 1650 77 mm. scale S. Kemp *(Morden, Surrey)*
99 Brummbar 1/32 scale R. Burford *(Upton Grey, Hants.)*
100 T34/76, early 1943 1/35 scale P. Hazell *(Ashford, Middx.)*
101 8th Army 1941 54 mm. scale L. R. Piper *(Basingstoke, Hants.)*
102 105 mm. Howitzer Assault 1/35 scale C. Hollick *(Upminster, Essex)*

103	Foot v. Horse 54 mm. scale	D. C. Grange *(Leytonstone, London)*
104	Encounter at Waterloo 54 mm. scale	D. C. Grange *(Leytonstone, London)*
105	Mamelukes 54 mm. scale	D. C. Grange *(Leytonstone, London)*
106	Resting 54 mm. scale	D. C. Grange *(Leytonstone, London)*
107	Napoleon Mounting His Horse 54 mm. scale	D. C. Grange *(Leytonstone, London)*
108	No title	V. Shepherd *(Hoddesdon, Herts.)*
109	Court Martial 54 mm. scale	A. Garvey *(Roehampton, SW15)*
110	Got 'im—right in the Breadbasket 1/35 scale	J. R. Griffiths *(Chelmsley Wood)*
111	Black Widow in for Overhaul Saipan 1944 1/48 scale	W. Nichole *(Birmingham)*
112	The Skirmish 54 mm. scale	P. W. Ladyman *(Ruislip, Middx.)*
113	Counter Attack, 1918 1/32 scale	B. M. Rust *(Hounslow, Middx.)*
114	Street Fighting 1/35 scale	B. M. Rust *(Hounslow, Middx.)*
115	Skirmish, Russian Front 1943 54 mm. scale	K. Palen *(West Norwood, SE27)*
116	Battle of Ligny, Blücher's Escape	K. Palen *(West Norwood, SE27)*
117	Apache v. Apache 1/76 scale	M. W. Mayes *(Lewisham, SE13)*
118	German Anti-tank Gun 1/35 scale	J. Stratton *(Pound Hill)*
119	Musical Interlude c. 1815 54 mm. scale	W. Elliott *(Kingsbury, 8TG)*
120	Opel Blitz 3-ton Lorry 1/35 scale	J. Hullis *(Ipswich, Suffolk)*
121	Sdkfz 251/1 & Panzer Grenadiers, Caen 1944 54 mm. scale	R. Bowden *(London W7)*
122	Ambush 1/35 scale	J. Moffat *(Langham, Essex).*
123	Advance 1/35 scale	S. D. Tame *(Seaford, Sussex)*
124	The Prisoner 54 mm. scale	S. D. Tame *(Seaford, Sussex)*
125	M.113 A.P.C. 1/35 scale	S. Westwood *(Solihull)*
126	War Elephant, 3rd Century BC 54 mm. scale	Capt. C. S. Grant *(B.F.P.O. 36)*
127	Chelsea v. Spurs, 1942 1/35 scale	R. Turner *(Devizes, Wilts.)*
128	Revolutionary Soldiers 1792 54 mm. scale	E. A. Pollard *(Nottingham)*
129	Dragoons 1807 54 mm. scale	E. A. Pollard *(Mapperley, Nottingham)*
130	Elven Court Scene 25 mm. scale	R. Phelan *(Woking, Surrey)*
131	German Tank, Summer 1/35 scale	P. Wylie *(Walworth, London)*
132	Russian Tank, Winter 1/35 scale	P. Wylie *(Walworth, London)*
133	"Up Guards, make ready" 1st Foot Guards repulse French Imperial Guardsmen, Waterloo	G. E. Scopes *(Tadworth, Surrey)*

CLASS MB: Converted Single Figures

No.	*Description*	*Name and Town*
1	Taisho—Japanese Army Commander	M. Allward *(Potters Bar, Herts.)*
2	French Grenadier	J. V. Purvis *(S. Croydon, Surrey)*
3	Trooper of the Guard 1833 54 mm. scale	P. W. Hawkes *(Orpington, Kent)*
4	German Lancer 1913 54 mm. scale	R. V. Hailes *(Stanmore, Middx.)*

EURO-MODELS

Stand 12

Euro-Models of Twickenham are importers and trade distributors of high quality wooden boat kits, period and modern, from Europe's leading manufacturers. Kits range in price from £8.00 to £275.00 + VAT.

There will be demonstrations of the Aero-piccola Vibro-fretsaw which will cut almost anything except your fingers, and a really superb twin cylinder marine engine with self pressurising boiler/burner.

Wooden and brass cannon kits are featured, together with a host of period and modern boat fittings offered for sale. There will also be fine timbers for modelling, i.e. lime, box, walnut, cedar, beech, mahogany.

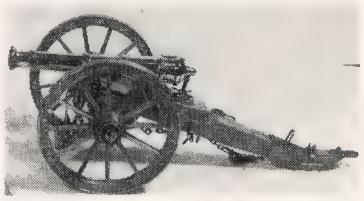
Many hand tools are offered, including those from Xacto, Dremel and Bonum of West Germany.

Centrepiece of the stand will be a 51″ model of H.M.S. *Victory* built from the Sergal kit, and other handsome models from kits by Stein-graeber, Aeropiccola, Mantua and France Maquettes.

CONWAY MARITIME PRESS LTD

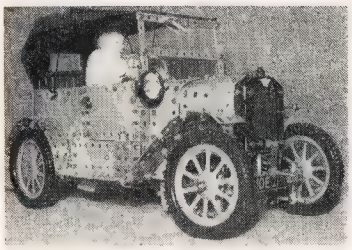
Stand 13

The central feature of Model Shipwright's stand will be the new kit of the naval cutter *Speedy*. This is an exhibition standard, wooden, plank-on-frame model, and during the course of the show, one of these kits will be constructed on the stand. All the books of interest to model-makers published by our parent company Conway Maritime Press will be on sale, and the new ship modelling books for 1976 will be unveiled for the first time to the general public. And, of course, the staff of *Model Shipwright* will be on hand to answer any queries, or just to discuss scale ship modelling generally.



Limbered 9 pdr. S.B.M.L. Gun to 1/14 scale with ammunition wagon (not in photo) using birch and mild steel, all hinges, hasps, straps etc fully functional. By K. R. Docking of Epping.

Duke of Edinburgh entry by K. R, Gibbs of Lydiard Millicent depicting Armstrong 12pdr. Field Gun c.1860. Scale 1½ in to the foot.



Nostalgic Meccano Austin 7—fully remotely controlled automatic two-speed gearbox. Builder Michael Edwards of Watford.

TRACTION ENGINE ENTERPRISES

Stand 15

A regular feature of the Model Engineer Exhibition is the ever-popular Traction Engine Enterprises Stand. Once again the company will have a large selection of Records, Books and Modes on Railways, Model Engineering, Traction Engines, Trams, Fairground and Street Organs, Canals, etc., "Vintage Steam" and "Old Motor", and a large range of Colour Slides. Framed Prints and other enthusiasts' items will also be on sale. Also a full range of pre-recorded cassettes.

There will also be a very large display of die-cast collectors' models on show. Rare Lesney, Dinky, Charbens, Benbros, Morestone, Budgie, Corgi and Timpo die-cast and Triang Tin Plate Models will be on sale.

Also represented on the stand will be Traction Engine Enterprises' associate company M.E. SPECIALIST PUBLICATION SUPPLIES, the leading supplier of bound, unbound and loose issues of Model Engineer and English Mechanics and a large range of Model Engineering books. Rare Model Engineering books now out of print will also be on sale.

A very large range of Model Engineer Indexes which have recently been reprinted by the company will be available to enable enthusiasts to complete their collection and volumes.

Of special interest to visitors will be the growing range of specialist books published by the company all of which will be on sale on the stand.

MODEL HOBBY CONSORTIUM

Stand 16

For many years now we have tried to offer to the visitor to the Exhibition Hobby Items at very special prices. This year will be no exception.

As usual, we have very many slightly damaged kits at greatly reduced prices, many sample ranges of items which have not previously been seen in this country, and a whole host of exciting merchandise from manufacturers throughout the world. These reduced prices mean you are able to continue your hobby even in today's times of severe inflation.

Also, we have a good selection of Plastic Kits from many different sources and a collection of modelling items which your normal stockist may not usually handle.

Many of our Plastic Kits will be on view, built up and contained in showcases.

We try to have something for everybody, so please come and visit us first.

BEATTIES OF LONDON LTD.

Stands 17, 18 & 19

Once again Europe's leading model shops are exhibiting a large selection of their ranges including Hornby, Hornby Minitrix, Fabulous Fleischmann, Rivarossi, Wrenn 00, Peco, L.G.B. and of course the smallest railway of all 'Z' gauge by Marklin, a full range of the excellent trackwork from Roco.

For show and for sale, you will find most railway accessories . . . trees, grass mats, and

5	"Sepp" Dietrich 80 mm. scale	K. P. Lyles *(Stanmore, Middx.)*
6	Wounded French Cuirassier 1809 54 mm. scale	J. Matchett *(Thames Ditton, Surrey)*
7	French Tambour de Grenadier	J. Day *(Aveley, Essex)*
8	French Grenadier of the Guard 77 mm. scale	J. Day *(Aveley, Essex)*
9	Taisho	J. Day *(Aveley, Essex)*
10	French Medical Orderly 1812 54 mm. scale	L. M. Bellers *(Grove Park, London)*
11	Chasseur a Cheval De La Guard 1804-1815	L. M. Bellers *(Grove Park, London)*
12	Mounted Officer of the Foot Artillery of the Line at the Battle of Friedland	L. M. Bellers *(Grove Park, London)*
13	Taisho Japanese Commdr. 12-13th C. 120 mm. scale	R. D. Clayton *(London N16)*
14	Line Dragoon Drummer	C. Davis *(Croydon, Surrey)*
15	Mounted Trumpeter Lancers of Berg 1813	D. Ginn *(Ely, Cambs.)*
16	10th New York National Zouaves 1861	T. Brown *(Tolleshunt Knights, Essex)*
17	Taisho (Japanese Commdr.)	I. Cushing *(Bexleyheath, Kent)*
18	Taisho Saburai	J. Tiernan *(Croydon, Surrey)*
19	British Sixth Dragoon Trumpeter 54 mm. scale	D. G. Kempster *(Nottingham)*
20	French v, Hussar 1815	R G. Perrott *(Pewsey, Wilts.)*
21	Scottish Knight c. 1300	J. M. Seabrook *(Kennington, London)*
22	German MG34 Machine Gunner	G. Sheppard *(Orpington, Kent)*
23	French Cuirassier 1815	P. Skinner *(Tunbridge Wells, Kent)*
24	British Coldstream Guard 1815 54 mm. scale	P. Skinner *(Tunbridge Wells, Kent)*
25	ADC Year XII Uniform	P. Taylor *(Wokingham, Berks.)*
26	Napoleon Emperor 54 mm. scale	S. R. Box *(Haywards Heath, Sussex)*
27	8th Army (single figure) 1/32 scale	P. Charles *(Chipping Norton, Oxon)*
28	6th Dragoon Junior Officer 54 mm. scale	M. Davis *(Croydon, Surrey)*
29	Trumpeter of French Lancers of the Line 54 mm. scale	P. McLeavey *(Kenley, Surrey)*
30	Napoleonic Mamaluke (mounted) 54 mm. scale.	J. A. Bradshaw *(Linton, Cambs.)*
31	Corporal Foot Grenadiers of the Guard 1815 54 mm. scale	D. Brown *(Barnehurst, Kent)*
32	Private, Black Watch, 1815 54 mm. scale	D. Brown *(Barnehurst, Kent)*
33	¼ of a Chess Set 54 mm. scale	D. J. Wright *(Ashbourne, Derbys.)*
34	French Infantryman of the Line 1815	I. J. Rawlins *(Basingstoke, Hants.)*
35	Taisho 1/35 scale	K. McGlynn *(Weston-super-Mare)*
36	Napoleonic Cuirassier 2nd Regt. 54 mm. scale	R. B. Allen *(London N16)*
37	French Line Grenadier	R. B. Allen *(London N16)*
38	French Impl. G2. Sapper 2nd Conscrit Chasseurs 1810	D. G. Prior *(Swindon, Wilts.)*
39	Rifleman 95th Regt. 1815 1/32 scale	D. G. Prior *(Swindon, Wilts.)*
40	—	—
41	Vistula Lancer Officer 54 mm. scale	B. T. Riches *(Anerly, SE20)*
42	French Guard Grenadier 1815 54 mm. scale	C. Allen *(Ashford, Middx.)*
43	Joachim Murat 1805 90 mm. scale	S. Kemp *(Morden, Surrey)*

44	English Mailed Knight 54 mm. scale	P. Hazell *(Ashford, Middx.)*
45	Genoese Crossbowman 1346 54 mm. scale	P. Hazell *(Ashford, Middx.)*
46	French Line Grenadier 1804-07	I. Waller *(Luton, Beds.)*
47	71st Highland Infantry Bugler	C. Peacock *(Croydon, Surrey)*
48	Johnnie Reb 1861 54 mm. scale	K. R. Brown *(Horsham, Sussex)*
49	Carabinier 54 mm. scale	G. D. Hall *(Gravesend, Kent)*
50	Private 1st Company 2nd Foot Guards 1815	D. Hockey *(Palmer's Green)*
51	Sergeant Major, Foot Grenadiers of the Guard 1810	D. Hockey *(Palmer's Green)*
52	Prince Poniatowski 1757-1813 54 mm. scale	J. Stratton *(Crawley, Sussex)*
53	French Cuirassier 1815	M. Edden *(Sutton Coldfield)*
54	22nd Regt. French Dragoons 1805 77 mm. scale	D. J. Wooldridge *(Billericay, Essex)*
55	Coldstream Guardsman	Christine Wright *(Sutton Coldfield)*
56	Scythian Horse Archer Persian Elite Trooper	P. Wilcox *(Norbury, SW16 4HL)*

CLASS MC: Unconverted or Scratchbuilt Single Figures

No.	*Description*	*Name and Town*
1	6th Dragoon Inniskilling 54 mm. scale	A. R. Phillips *(Edgware, Middx.)*
2	Ape on Horseback	A. R. Phillips *(Edgware, Middx.)*
3	Silesian Jager 1815 54 mm. scale	C. M. Desmond *(Brixton, London)*
4	Lithuanian Tartar 1812-1813 54 mm. scale	T. Neate *(Melksham, Wilts.)*
5	Mameluke 1804-1814 54 mm. scale	T. Neate *(Melksham, Wilts.)*
6	7th French Cuirassier—1815 54 mm. scale	P. W. Hawkes *(Orpington, Kent)*
7	Russian Dragoon 1700 54 mm. scale	R. V. Hailes *(Stanmore, Middx.)*
8	Officer 15th The Kings Hussars 1824 54 mm. scale	R. V. Hailes *(Stanmore, Middx.)*
9	Montenegro Reserve 1913 54 mm. scale	C. Stubbings *(Basingstoke, Hants.)*
10	Baden Grenadier 1812	P. M. Cox *(Ilford, Essex)*
11	Hungarian Grenadier 52nd Regt. 1809	P. M. Cox *(Ilford, Essex)*
12	Imperial Yeomanry Scout Boer War 54 mm. scale	K. P. Lyles *(Stanmore, Middx.)*
13	South Gaulish Cavalryman 54 mm. scale	P. Jacques *(N. Wembley, Middx.)*
14	Grenadier Officer, Austrian Dragoons 1713 54 mm. scale	S. Hobbs *(Portsmouth, Hants.)*
15	General P. G. T. Beauregard C.S.A. 1862 54 mm. scale	S. Hobbs *(Horndean, Hants.)*
16	General Rommel 1/6 scale	R. Scott *(Feltham, Middx.)*
17	Plains Indian 1/35 scale	C. J. Crook *(Ashford, Kent)*
18	Sergeant 2nd Belgian Carabiniers 54 mm. scale	S. R. Box *(Haywards Heath)*
19	Sergeant 69th (Grenadier Comp.) 54 mm. scale	M. Batten *(Maidenhead, Berks.)*
20	French Line Infantryman "Retreat from Moscow"	M. Batten *(Maidenhead, Berks.)*
21	American Soldier from War of Independence	M. L. Bowis *(Purley, Surrey)*
22	Southern Skirmisher 1862 54 mm. scale	T. Brown *(Tolleshunt Knights)*
23	Suerte De Varas 54 mm. scale	D. M. Catley *(Reigate, Surrey)*
24	Matador 54 mm. scale	D. M. Catley *(Reigate, Surrey)*

colourings . . . Busch N gauge scenic accessories and Brawa lights.

In addition to all the excellent railway ranges Beatties have a very large section for plastic kits by Tamiya, A.M.T., Airfix, Revell, and E.S.C.I. plus many more.

Beatties offer many items as special exhibition offers so do not miss the Beattie stand.

In addition to offering the best value in the trade, Beatties provide their world famous service and permanent exhibitions at their branches at: 112 High Holborn W.C.1, 10 The Broadway, Southgate, N.14, 14 Spring Gardens, Manchester; 16–18 King Charles St., Leeds 1; 363 Lewisham High St., London S.E.13; 26 South Mall, Birmingham Shopping Centre, Birmingham 1; 5 Mount St., Nottingham and 36–37 Dawson Way, St. Johns Centre, Liverpool 1. The same service is available from the mail order department at Southgate.

PLAISTOW PICTORIAL

Stand 20

Plaistow Pictorial will be offering for sale their complete range of prints and posters.

Especially popular are the new range of full-colour mini prints for the serious collector.

Gordon Riley's Vintage Aircraft Directory 1975 edition and Aircraft Museum Directory will also be available and all the back issues of After the Battle magazine.

Come and see what's new on Stand 20—Plaistow Pictorial.

HINCHLIFFE MODELS

Stand 21

Hinchliffe Models once again take pleasure in attending the main annual event of the year in the modelling calendar.

This year we shall have on view many new and exciting products. Long known for our quality of model and ability to supply the ever increasing demands of the retailer at home and abroad, we still welcome this opportunity to meet you, our customer, in person at stand 21.

As usual we will have our complete range of figures and equipment models for you to view plus the different design members of our staff who will attend from time to time and take pleasure in discussing their past and future work with you.

If you talk of Military Modelling, you talk Hinchliffe. If you talk Hinchliffe then it's Military Modelling. We still lay claim to being the most comprehensive military modelling company in the world. You don't see it that way ? Well, come along and see for yourself and if seeing isn't believing then we will only be too glad to explain and perhaps take the opportunity to sell you the most comprehensive catalogue of Military Modelling in the world.

KENNION BROS. (HERTFORD) LTD.

Stand 22

Charles Kennion is still supplying castings and materials for most of the world's leading designers of locomotives since 1945, but his practical experience goes back to 1921 when he was with his father George Kennion, one of the leading model locomotive craftsmen of his day—five times winner of the Society's Challenge Shield—now known as the "Kennion" trophy. This 55 years experience is now at your service in the supply of designs, castings and materials for building steam locomotives, and samples of almost everything to build locomotives.

This year, again the feature will be precision made hexagon head steel screws in 3, 4, 5, 6, 7 and 8BA x ¼", but each with a smaller size BA head. Nuts to match the size will also be available and the price is below that of 1970, being only £1 for 50 screws and £1 for 50 nuts.

A full range of copper, brass and steel rivets, to give that neat appearance to any model, is also available. Copper tubes from 1/16" o.d. to 6" o.d. and almost every material required on locomotive and traction engines etc.

A call to the Stores at 2 Railway Place will be an eye-opener and a delight to all those

seeking raw materials, any day by appointment but normally a six day week.

It is no longer just a business but a delightful "way of life".

SKYTREX LTD.

Stand 24

This is our first M.E. although we have appeared on other stands previously. As most will know we manufacture and retail a large and varied range of goods aimed primarily at the wargamer. What is perhaps less well known, is that our 1/200 range of models also has a large appeal to railway modellers in small scales. If you haven't seen these models please take this opportunity of doing so.

On the stall we have assembled for sale some of the finest painted figures in this country. These items whilst not cheap do not cost the earth either and would be worthy of a place in most collections.

Naturally there will be our full range of 1/300 micro-armour on sale together with many accessories including the Bellona microterrain.

For the naval wargamer there is also much to see from Greek galleys to guided missile destroyers plus the rules and information to simulate warfare from most periods of history.

Come and see us at stall 50, have a chat, we may have something you need, if not, we can possibly add your requirements to our plans for future development.

A. T. LEE & CO. LTD.

Stand 25a (also Stand 46 & 47)

Will be displaying the "Bottle-chopper" the original all-metal model handicraft precision made tool. For converting glass containers (bottles, jars, etc.) into useful household and decorative items.

Miracle Bond, the fantastic space-age adhesive for all model making. A bonding glue which joins in seconds. Continuous demonstrations during the exhibition.

HARRY BUTLER (MODELS)

Stand 26

Once again one of the main attractions of the Model Engineers Exhibition will be the superb 46' diameter electric R.T.P. model aircraft flying display. Here you can see a wide range of models, from simple sheet balsa silhouettes to fully detailed scale types, being put through their paces. Each year improved standards of flying are established and this year should prove exceptional because of the special flying competition arranged by the exhibition organisers.

The suspended runway of the exhibition R.T.P. set up presents the ideal, but this type of elaborate arrangement is not essential to good flying. A circuit in the back garden or even a small circuit in the club house or dining room, can provide just as much pleasure. The versatility of the system allows for a wide range of sites and conditions and there being no offensive smells, noise or straying models to annoy other occupants or neighbours, flying can continue at all times.

If you are thinking of setting up electric flying and need expert advice or are just interested in this form of aeromodelling, then come and see us on Stand No. 26. We shall be pleased to show you all our latest equipment and put you on the right lines to achieving first time success.

INTERNATIONAL PLASTIC MODELLERS' SOCIETY

Stand 28

The International Plastic Modellers' Society is a world-wide organisation for those interested in making plastic models.

Started in England some 15 years ago there are now branches in Australia, New Zealand, France, Germany, South America and the United States of America, as well as many other countries.

The U.K. branch is responsible for the administration of members who are scattered the length and breadth of the country. There are many local branches based on towns such as Edinburgh, London, Leeds, Sheffield, Reading, Brighton, which are usually organised on a county basis. These branches have monthly

25	Guiseppe Garibaldi 54 mm. scale	K. S. Frampton *(Portsmouth, Hants.)*
26	Assyrian Spearman 54 mm. scale	K. S. Frampton *(Portsmouth, Hants.)*
27	Russian Hussar 1813 54 mm. scale	M. J. Nutley *(Bedford, Beds.)*
28	Private, 2nd North Netherland Regt., 1815	D. W. Probert *(Maidenhead, Berks.)*
29	Private, Chasseur Company, French Light Infantry 1815	D. W. Probert *(Maidenhead, Berks.)*
30	Grenadier of the Old Guard 1815 wearing forage	D. W. Probert *(Maidenhead, Berks.)*
31	Black Watch Piper	J. Ranger *(Guildford, Surrey)*
32	Horror of the Hun 54 mm. scale	D. G. Kempster *(Bulwell, Nottingham)*
33	Gaul Cavalryman 54 mm. scale	D. G. Kempster *(Bulwell, Nottingham)*
34	Royal Engineer Drum Major 1975 54 mm. scale	G. Wilson *(Hastings, Sussex)*
35	British Infantryman 1941	G. Wilson *(Hastings, Sussex)*
36	After Battle of Alma 1854 54 mm. scale	J. A. Roberts *(Enfield, Middx.)*
37	The Six Million Dollar Skeleton 1/6 scale	M. L. Rowland *(London)*
38	Scottish Highlander 1730 54 mm. scale	P. Skinner *(Tunbridge Wells)*
39	Bavarian Horse Artillery, Russia 1812 54 mm. scale	A. J. Smith *(London, NW8)*
40	L'Empereur 1/6 scale	D. Brown *(Barnehurst, Kent)*
41	Elizabethan Mercenary 54 mm. scale	D. Harvey *(Portsmouth, Hants.)*
42	"Gawd This Heat" 54 mm. scale	A. T. Kettle *(Eastwood, Notts.)*
43	Trooper of the Native Horse 54 mm. scale	A. T. Kettle *(Eastwood, Notts.)*
44	Colonel Heymes, Aide De Camp to Marshal Ney 1/32 scale	K. McGlynn *(Weston-super-Mare)*
45	Marshal Ney 54 mm. scale	A. F. McQueenie *(Bushey, Herts.)*
46	Visigoth Warrior 715 AD 54 mm. scale	J. N. Potter *(Beckenham, Kent)*
47	Chasseur A'Cheval 54 mm. scale	S. Kemp *(Morden, Surrey)*
48	Wounded Lancer 54 mm. scale	W. Hubbard *(Kirby Muxloe, Leics.)*
49	Capt. Death Hussars 54 mm. scale	W. Hubbard *(Kirby Muxloe, Leics.)*
50	"Corum Jhaelen Irsei" 54 mm. scale	I. Waller *(Luton, Beds.)*
51	Minor Vignette of 2 Waffen SS Men	T. Golzen *(Putney, SW15)*
52	French Infantryman 1914 54 mm. scale	K. R. Brown *(Horsham, Sussex)*
53	Anatolian Infantryman 75 mm. scale	G. J. Carter *(Maidstone, Kent)*
54	Rogers Ranger 75 mm. scale	G. J. Carter *(Maidstone, Kent)*
55	Pikeman 1642 75 mm. scale	G. J. Carter *(Maidstone, Kent)*
56	French Cuirassier 1809 90 mm. scale	G. J. Carter *(Maidstone, Kent)*
57	Saxon Housecarle 1066 90 mm. scale	G. J. Carter *(Maidstone, Kent)*
58	Drummer of the 73rd Foot 1815 1/32 scale	N. C. Scott *(Northwood, Middx.)*
59	French Line Infantry Carabineer 1908-15 54 mm. scale	J. Stratton *(Crawley, Sussex)*
60	"Grenadier A'Pied, Garde Imperial, Tenue A'Compaigne"	J. Stratton *(Crawley, Sussex)*
61	U.S. Para Trooper 1944 54 mm. scale	R. Bowden *(London, W7)*
62	Tartares Lithuaniens 1812 54 mm. scale	E. A. Pollard *(Mapperley, Notts.)*
63	Cuirassier 1815 54 mm. scale	E. A. Pollard *(Mapperley, Notts.)*

CLASS MD: Artillery. Competition for exhibits consisting of field pieces and equipment with or without accompanying figures to any scale

No.	*Description*	*Name and Town*
1	British Limbered 9 pdr. S.B. M.L. Gun and Ammunition Wagon	K. R. Docking *(Epping, Essex)*
2	2 pdr. Gun Portee. Scratchbuilt model of W.W.2 gun carrier	C. Miners *(Cheltenham, Glos.)*
3	"AMRA" Anti-mine roller attachment	C. Miners *(Cheltenham, Glos.)*
4	SK.D.FZ 222 Light Armoured Car	P. J. Hegarty *(Stamford Brook, W12)*
5	8″ Mark 5 Howitzer	P. Jacques *(N. Wembley, Middx.)*
6	Carrier Valentine, 25 pdr. Gun Mark 1 "Bishop"	C. Harwood *(Finchley, London)*
7	Matilda Tank Mark II	C. Harwood *(Finchley, London)*
8	Autoblinda 41 of 1941	A. J. Smith *(London)*
9	Zundapp KS 750 Combination 1/9 scale	A. L. Hope *(Rochester, Kent)*
10	ADKFZ 232 Armoured Car 1/32 scale	T. Woolford *(London, W11)*
11	Australian M.113-A1 (Fire support) 1/35 scale	L. Kemp *(Aldershot, Hants.)*
12	Pzkfw IV Ausf 4 1/35 scale	L. Kemp *(Aldershot, Hants.)*
13	S.A.S. Jeep 1/35 scale	A. J. Dennis *(Pinner, Middx.)*
14	Infantry Tank Mark IV (A22) Churchill Mk I	A. T. Bradford *(Barnet, Herts.)*
15	A Bishop of the Sixth Armoured Division Sicily July 1943	A. T. Bradford *(New Barnet, Herts.)*
16	L.33 155 mm. Self-Propelled Howitzer/gun	N. Cunningham *(London WC1)*
17	U.S. Army M60 A2 Medium Tank	D. M. Prescott *(East Dulwich, SE22)*
18	Hunting Panther 1/24 scale	J. W. Hydel *(High Wycombe, Bucks.)*
19	68 pdr. Carronade circa 1805	R. A. Newbury *(Rochester, Kent)*
20	T34/76 (1942) Tank 1/35 scale	S. Savarese *(London NW1)*
21	M113 U.S. A.F.C. 1/35 scale	S. Savarese *(London NW1)*
22	Special Air Service Jeep 1/35 scale	G. Sheppard *(Orpington, Kent)*
23	German Heavy Armoured Car (8 Rad) ADKFZ 232	G. Sheppard *(Orpington, Kent)*
24	Sturmgeschuetz III Ausf G 1/35 scale	P. Skinner *(Tunbridge Wells, Kent)*
25	Brief Encounter	S. N. Abbey & T. Forrest *(Chesterfield, Derbys)*
26	18 pdr. S.B. Garrison Guns (A pair of)	K. C. Rains *(Harlow, Essex)*
27	Sturmgeschuetz III 1/35 scale	R. Burford *(Upton Gray, Hants.)*
28	M48A2 Patton III 1/32 scale	R. Burford *(Upton Gray, Hants.)*
29	Churchill Tank made from Balsa	P. Taylor *(Stanmore, Middx.)*
30	Sturmpanzer 43 1/32 scale	M. Quinn *(Englefield Green, Surrey)*
31	8 ton Semi Track SdKF27 1/35 scale	M. Quinn *(Englefield Green, Surrey)*
32	M60A2 U.S. Tank 1/35 scale	J. A. Lupton *(Loughton, Essex)*
33	Zundapp KS 750 M/C & Sidecar 1/9 scale	P. Webster *(Sutton Coldfield)*
34	D.U.K.W. Amphibious Truck	P. Webster *(Sutton Coldfield)*
35	Stalwart 1/76 scale	R. Turner *(Devizes, Wilts.)*
36	Centurion ARV 1/76 scale	R. Turner *(Devizes, Wilts.)*
37	Fox Armoured Car 1/76 scale	R. Turner *(Devizes, Wilts.)*

meetings at which there are film shows, lectures, and competitions for all types of models. The National organising body hold a National Championship every year and models reach the finals of this competition through branch eliminating heats.

A monthly magazine is issued to all members and there is also a free technical, advisory service which will answer members' questions on practically any subject allied to the hobby.

Many of the country's leading modellers as well as modelling journalists and authors are members, and a high percentage of manufacturers and model shops hold associate membership.

There is no age limit and full details of the Society together with an application form for membership can be obtained from: The Secretary, Mr. John Salmon, "Oakbank", 35 Clares Green Road, Spencers Wood, Reading, Berks.

MINIATURE FIGURINES LTD.

Stand 31

Minifigs the registered trade mark of Miniature Figurines Limited is well known Internationally in the sphere of top quality wargame figure manufacturing. Besides the main production unit in Southampton, Minifigs have granted production licences to a New York company who cover the whole of North America, and one in Sidney covering Australia. This arrangement allows the efficient International manufacturing and distribution associated with the name Minifigs. Although independently operated, all three companies are professionally managed by avid wargamers who know what the wargamer wants often before he does.

Newcomers and established wargamers know they need look no further than the company which has the most extensive range, many unique in themselves, a high standard of design, constant quality of products and prompt attention with mail order requirements, together with the policy of supplying only selected retailers specialising in models and modelling with personal and friendly service. All the figures are manufactured in the best quality jewellery alloy available and backed-up with a service second to none.

Minifigs are continually adding and improving the two production scales of 25 mm. and 15 mm. designed at 4 mm. and 2½ mm. to the foot respectively, so it is hoped that many of the new periods and additions to existing ranges will be available at the stand. Because we have such a large number of figures in production it is impossible to have everything available at the stand, but we will try our best by bringing as much stock as physically possible.

BRANT WRIGHT ASSOCIATES LTD

Stand 32

On show four outstanding clocks by John Wilding.

1. The Weight Driven 8 Day Wall Clock, winner of a Silver Medal at the 1972 exhibition.
2. The Skeleton Clock, winner of a Silver Medal at the 1973 exhibition.
3. A Weight Driven 30 hour Alarm Clock; an exact replica of an 18th Century 30 hour Alarm clock.
4. A Congreve Clock on show for the first time starting December 1975 and being serialised in the Horological Journal, a must for every clock enthusiast to make.

In addition copies of the Horological Journal, the oldest and first ever technical trade Journal in the world, devoted to watches and clocks, for potential and actual clockmakers a "must" every month.

A special offer is being made to visitors to our stand to purchase John Wildings books and the Horological Journal. An unrepeatable offer and of course, here you can meet John Wilding in person.

CRAFTS & KILNS

Stand 33

We are a small firm of craftsmen manufacturing and supplying electrical furnaces for all those crafts which require high temperature furnaces

These include jewellery casting, enamelling, small model engineering castings, sculptural castings and others. In spite of the relatively large quantities (well over 1000 per year), and a large variety of sizes and designs (over a dozen standard sizes and designs), every single one is made by hand, assembled from sub-assemblies made by hand, by craftsmen who not only make kilns, but use them themselves for all the above mentioned applications, and many more.

We are convinced that the performance of our kilns are unique in their flexibility and efficiency.

Our standardly available metal melting furnaces include the smallest, which is 2½" diameter by 4" deep firing chamber, to the largest which is 15" diameter by 20" deep firing chamber. The firing chambers covered in our standard range increase with approximately 1" in each direction between successive sizes. Being manufacturers of all these kilns and supplying direct to the consumer, enables us to be highly competitive. All of our kilns are tested for 5000 working hours, and are fully guaranteed for a period of one year.

MORRIS AND INGRAM (LONDON) LIMITED

STANDS 34 & 35

BADGER Airbrushes and PACTRA Paints will be demonstrated by the exclusive distributors, Morris and Ingram (London) Limited.

The full range of seven Badger Airbrushes will be available for demonstration and inspection, and trained staff will be in attendance to answer questions.

There is a Badger to meet the needs of all model makers ranging from the Model 250 which is ideal for larger areas, dioramas, etc. to the 100 XF or 100 GXF which is a must for the serious militarist.

Exhibited for the first time will be the full range of PACTRA Authentic Military Colours as well as 'Namels and Sprays, also Liquid, Standard and the new Non Toxic cements.

In addition, a full range of Rub-down Decals, Propellants, Compressors and accessories will be available.

The theme of the exhibit is: BADGER—PACTRA — Partners in Fine Finishing.

ARGUS BOOKS LTD.

STANDS 36 & 42

ARGUS Books Ltd. is an associated book publishing company of Model and Allied Publications Ltd., publishers of the well-known MAP magazines—*Military Modelling, Model Engineer,* etc.—and the company embraces several imprints which are household names to modelling and hobby enthusiasts. Harleyford, Bellona and MAP Technical Publications are among the ranges of books on sale on the stand which offer an extensive coverage of most model and hobby interests.

Railways, ships, model soldiers, A.F.V.'s, wargames, model aircraft, boats and cars are all well covered in an impressive list and a catalogue is available describing well over 300 titles. For the practising model engineer the list of books covering tools, materials, live steam and miniature engineering techniques is unsurpassed and a whole reference library for novice and expert can be found in the Argus Books range.

New titles to look for this year include Harry Woodman's acclaimed book Scale Model Aircraft in Plastic Card (£2.95), Military Modelling Annual No. 2 (£2.95), Aeromodeller Annual 1975-76 (£1.95), Nepean Longridge's classicThe Cutty Sark (£5.00), and a fine new Bellona title British Light Military Trucks, 1939-45 (£1.75).

For the practical modeller, new titles include two related books by L.C. Mason, Building Mastiff: A Four-Cylinder Petrol Engine, and Model Four-Stroke Petrol Engines (£3.00 each). See these and many more on the Argus Books' stand.

38	Centurion Bridgelayer 1/76 scale	R. Turner *(Devizes, Wilts.)*
39	"Stuck in the mud" 1/76 scale	S. Cowan *(Gravesend, Kent)*
40	"Churchill Ark Mk. II"	S. Cowan *(Gravesend, Kent)*
41	Rommel's Half-Track	D. Hambrook *(London, SW20)*

CLASS N: Tools and Workshop Appliances

No.	*Description*	*Name and Town*
1	Tool and Cutter Grinder	E. P. Hyatt *(S. Croydon, Surrey)*
2	Kennedy Bar & Tube Bender	E. P. Hyatt *(S. Croydon, Surrey)*
3	Universal Indicator Stand for Selecta Unimat Lathe	R. Farrar *(Basingstoke, Hants.)*
4	M.E. Sensitive Drilling Machine	S. P. Wood *(Amersham, Bucks.)*
5	A Variable Pitch Spiralling Workhead for Cutter Grinding	J. E. Brown *(Salisbury, Wilts.)*
6	Light Universal Milling & Accessories Machine	K. C. Rains *(Harlow, Essex)*
7	1. Lathe Accessories 2. Bench Grinder	S. H. Willets *(Lydney, Glos.)*
8	Patterns for "Quorn" Cutter Grinder	W. C. J. Truscott *(Perranporth, Cornwall)*
9	Tool and Cutter Grinding Jig	N. W. Tinker *(Beeston, Nottingham)*
10	Sprocket Puller	I. Huggett *(Tunbridge Wells, Kent)*
11	Scribing Block	I. Huggett *(Tunbridge Wells, Kent)*
12	Potts Tailstock Turret in box	N. D. Bailey *(Twickenham, Kent)*
13	Dividing Head for Lathe	E. T. Bartlett *(Dartford, Kent)*
14	Toggle Press	P. B. Cocker *(Preston, Lancs.)*
15	Quorn Cutter Grinder	D. H. Wilkinson *(Cricklewood, NW2)*
16	Prototype ⅜" Bench Vertical Miller	G. H. Park *(Cleckheaton, W. Yorks.)*

CLASS O: Engineering Scale Models (Non-working)

No.	*Description*	*Name and Town*
1	SG Mk2. Power Grading Aveling-Barford ½ scale	T. N. Clements *(Grantham, Lincs.)*
2	Daimler Brewers Dray approx. 1925	A. Razzell *(London, SW8)*
3	"Scamp" AGV Advance Geograph Vehicle/Tractor	J. Taylor *(Bexley, Kent)*
4	Lotus 72/R5 Formula 1 car	D. Latisonoks *(Kempston, Beds.)*
5	Citroen 5CV static model in case	K. R. Norman *(Brighton, Sussex)*
6	1938 Jaguar SS100 3½ Litre	K. R. Norman *(Brighton, Sussex)*
7	1925 Austin 7 Open Tourer	K. R. Norman *(Brighton, Sussex)*

CLASS P: Scenic and Representation Models (including Architecture)

No.	*Description*	*Name and Town*
1	Mail Coach arriving at Inn	G. G. E. Blackman *(Watford, Herts.)*
2	Slocum's *Spray*	J. Ling *(Dorking, Surrey)*
3	Knox-Johnston's *Suhaili*	J. Ling *(Dorking, Surrey)*
4	Chichester's *Gipsy Moth*	J. Ling *(Dorking, Surrey)*
5	"A Change of Horses"	J. D. Wilmshurst *(Maidstone, Kent)*

6	"Lady Isabella" Laxey Waterwheel I.O.M.	B. Hewer *(Dronfield, Sheffield)*

CLASS Q Horological, Scientific and Optical Apparatus

No.	*Description*	*Name and Town*
1	Grandfather Clock	G. M. Waugh *(Sunderland, Co. Durham)*
2	Eight-day Weight Driven Wall Clock	J. F. Lowndes *(Blackpool, Lancs.)*
3	Eight-day Skeleton Clock	J. F. Lowndes *(Blackpool, Lancs.)*
4	Carriage Clock	Dr. B. M. Frost-Smith *(Penrith, Cumbria)*
5	Eight-day Skeleton Clock	A. Dack *(Broadstairs, Kent)*
6	Digital Calendar Clock	Dr. H. H. Neville *(Welwyn, Herts.)*
7	Electrically-wound Pendulum Clock	J. W. Rivis *(Bournemouth)*
8	One-year Long Case Clock	C. B. Reeve *(Hastings, Sussex)*
9	Astronomical Clock	B. Elliott *(Weybridge, Surrey)*

CLASS R: General Craftsmanship—not otherwise classified

No.	*Description*	*Name and Town*
1	Kentucky Rifle	M. Marriage *(Romford, Essex*
2	.44 Walker Whitneyville 1847 Colt Revolver	F. A. Harris *(Milton Keynes)*
3	Model Farm Tip Cart	G. M. Waugh *(Sunderland, Co. Durham)*
4	Decorated Knight on Horseback	G. M. Waugh *(Sunderland, Co. Durham)*
5	J.A.P. Speedway Bike of the early 50s	F. W. Waller *(Watford, Herts.)*
6	Cannon and Crew	C. Havis *(Benfleet, Essex)*
7	Vintage Model Car and Crew	C. Havis *(Benfleet, Essex)*
8	"Carlton" Track Cycle	A. Matravers *(Guildford, Surrey)*
9	16th Century Foliot Verge Clock (Meccano)	M. D. Edwards *(Watford, Herts.)*
10	Meccano Austin 7	M. D. Edwards *(Watford, Herts.)*
11	Christ and the Robbers	C. Havis *(Benfleet, Essex)*
12	Sir Walter	C. Havis *(Benfleet, Essex)*
13	Robin Hood	C. Havis *(Benfleet, Essex)*
14	Rickshaw	C. Havis *(Benfleet, Essex)*
15	The *Mayflower* 1620 Table Lamp	L. Fillery *(Ashford, Kent)*
16	H.M.S. *Victory* Table Lamp	L. Fillery *(Ashford, Kent)*
17	South Midland Spindle Sided Wagon	T. B. Taylor *(Cheltenham, Glos.)*
18	Pre-War London Transport TF Class Green Line Coach (Meccano)	A. J. Ashford, *(Woolwich, London)*
19	Post-War London Transport TD Class single-deck Bus (Meccano)	A. J. Ashford *(Woolwich, London)*
20	Quo Supercharger	C. Davis *(Croydon, Surrey)*
21	Farm Cart Buckinghamshire Barge Waggon	R. J. Hawes *(Morden, Surrey)*
22	An Old Lorry	S. Jacques *(Edmonton, London)*

MICHAEL HOLDEN ASSOCIATES LTD.

Stand 37

From their works at Banbury, Oxfordshire, Michael Holden Associates produce working steam models to a very high standard of engineering combined with realistic detail and finish. On their Stand No. 37, can be seen a production model of the ½" scale Allchin 1906 traction engine, which can be purchased either complete or in kit form, with additional extras including Showman's fittings and fired by coal or gas.

To preserve the appearance and character of the engine the gas-fired versions are coupled to an authentically designed living van in which is located a pump operated water tank and a gas cylinder to ensure over 30 minutes' continuous firing. Kit form models are manufactured with all parts machined for easy and accurate assembly.

Other models on display and available for order include "The Portable"; Richard Trevithick's "Pen-Y-Darran"; Richard Trevithick's "Mine Engine"; a variety of plinth mounted aircraft models constructed in brass and aluminium either polished or painted respectively; a model of British Rail's H.S.T. constructed to 1/20 scale.

Of great interest to steam enthusiasts throughout the world is the 1½" scale Burrell Scenic Showman's Road Locomotive which will be available from the production line later this year.

Full size model prints can be seen on the Stand.

BIVOUAC BOOKS LTD.

Stand 38

Specialists in military, naval and aviation book-selling. With thousands of secondhand volumes in stock at 104 Kilburn Square, London, N.W.6 (telephone 01-328 1492), together with a comprehensive shelving of new books and boxed wargames. Publishers of the popular ENSIGN series of naval monographs which has just been increased by the appearance of volumes on Town Class Cruisers and HMS *Hood*. Also the publishing list includes UNIFORMATION series of Napoleonic referenec prints and a new series of World War 1 aviation reprints launched with THE ANNALS OF 100 SQUADRON. Publishing office at 21/25 Earl Street, (Top Floor), London, E.C.2 (telephone 01-247 5683) also houses a painting and prints gallery plus a collectors' haven of small militaria, reference prints, painted figurines, albums, ephemera and boxed games. Open Wednesdays, Thursdays & Fridays.

PRECISION PETITE LIMITED

Stand 44

Precision Petite Limited are pleased to have the opportunity once again to present their kits of miniature drills with accessories of French manufacture.

The entire range of our products are now available separately. The latest development is a new Flexible Drive approximately 22 inches long and will give a further application for the drill unit, making even very aggravating jobs a pleasure. Precision Petite Limited will look forward to meeting old and new friends on their Stand 44 where demonstrations will be carried out all day and every day during the Exhibition. Come along and try our products for yourself. We wager you will be very impressed.

As a matter of interest our Kits are now used in many very important establishments such as Atomic Energy Research, G.P.C. Research, Ministry of Defence Research and numerous Electronic Industry Research Laboratories throughout the U.K. and the world.

POLAR PRODUCTS

Stand 45

A wide range of tools, of interest to both model engineers and D.I.Y. enthusiasts, will be exhibited on Stand No. 45.

Among the useful items on display will be sabre saws, hole saws, precision screwdrivers, files, hammers, spanners, various twist drills, tube cutters, clamps, pliers, levels, measures,

wrenches, triangles, bit braces, stone sets, coping saws, pincers, glass cutters, punches, scrapers, utility knives, etc., etc.

Visitors to the stand will be bound to find at least one item they need, and will be pleasantly surprised by the highly competitive prices, an important consideration in the present inflationary times.

CORONET TRADING CO.

Stand 49

Coronet offer machinery and accessories for the Lapidary, as well as a large range of jewellery fittings etc. In particular they carry a variety of better class cast pendant and ring mounts. Semi-precious, synthetic and artificial stones are also available, including Austrian Crystals.

Other Crafts include Enamelling (both hot and cold), Candlemaking, Plastic Embedding etc.

Information will be available for those interested in the use of stone slabs for the mounting of models.

QUERCUS GEMS

Stand 50

What do we do?

Well, we like CRAFTS but for a start we must concede we are not even second biggest.

Do we try harder?

Could be . . . we for a few products (and not a few ideas) you might find useful as a craft/lapidary retailer or jeweller. For instance, John has a few attractive little numbers in silver or gold for anyone with an eye for an unusually fine stone or setting. Or a unique (but probably not for long!) range of enamelled rings and pendants—Andrena looks after that side of things, kids allowing.

Or our own range of stainless steel rings—the nice ones, with the smooth edges. Or over 130 different shapes in copper for enamellers.

Or a wholesale range of silver rings and pendants which we modestly consider to be as good as the next man's. In fact we can now offer you over 40 super designs set with cabochons or faceted stones and more are coming along all the time—we just can't stop Jeff making them!

23	Ship in Bottle (Brig)	D. F. Mossman *(Clapton, London)*
24	Ship in Bottle, *Cutty Sark*	D. F. Mossman *(Clapton, London)*
25	Ship in Bottle, *Cutty Sark*	D. F. Mossman *(Clapton, London)*
26	12v. Electrical Drill in Case	D. F. Mossman *(Clapton, London)*
27	Farm Waggon	B. A. Rutherford *(London W3)*
28	Pocket Flintlock Pistol, cased with accessories	K. R. Gibbs *(Lydiard Millicent, Wilts.)*
29	Welsh Gambo Cart	A. J. Cook *(Luton, Beds.)*
30	Scammell 100 ton Prime Mover complete with 80 ton drop well trailer	M. R. Eames *(Edgware, Middx.)*
31	Steam	W. H. Stokes *(Basildon, Essex)*
32	1861 Colt Pocket Revolver, cased	B. D. Hutchings *(Long Eaton, Nottingham)*
33	Working model of Stephenson's *Rocket*	G. M. Waugh *(Sunderland, Co. Durham)*
34	Hansom Cab	D. R. Davidson *(Brentwood, Essex)*
35	Drag Racer	H. J. Halliday *(London, SE15))*
36	Five plans of model aircraft designed by E. W. Evans	M. W. Wilkinson *(Kettering, Northants.)*
37	Sussex Waggon	J. Harwood *(Luton, Beds.)*

CLASS S: Junior Section. For any type of model or mechanical work (except military figures) by a junior under the age of 16 by 31 December, 1975

No.	*Description*	*Name and Town*
1	H.M.S. *Leander*	H. Nicholls *(Lee-on-Solent)*
2	Motorcycle Plastic Model of 1911 Clyno	J. Craggs *(Purley, Surrey)*
3	*Cutty Sark*	T. Beer *(Croydon, Surrey)*
4	*Discovery*	T. Beer *(Croydon, Surrey)*
5	True-line Executive Model Aircraft	C. J. Haslam *(Mosborough, Sheffield)*
6	Roadworks	D. W. Hatherill *(Croydon, Surrey)*
7	Bristol Beaufighter	J. Penrose *(Harpenden, Herts.)*
8	Hawker Harrier	J. Penrose *(Harpenden, Herts.)*
9	N. A. Mustang	J. Penrose *(Harpenden, Herts.)*
10	Hawker Hurricane	J. Penrose *(Harpenden, Herts.)*
11	Steam Engine (Stuart 10V)	T. L. Proudler *(Brierley Hill, W. Midlands)*
12	Horned Dinosaur—Triceratops	Nicola Skinner *(Tunbridge Wells, Kent)*
13	*Wave Rider* Power Boat	B. W. Wood *(Amersham, Bucks.)*
14	Honda 750 Four Motorbike	D. Hambrook *(London, SW20)*
15	H.M.S. *Trafalgar* Battle Class Destroyer	D. Hammond *(Fleet, Hants.)*
16	Stuart-Turner No. 9 Horizontal Steam Engine	J. Hughes *(Co. Antrim, N.I.)*
17	19th C. Stanhope Gig	J. Cummings *(Horsham, Sussex)*
18	Walrus Flying Boat	S. A. Cummings *(Horsham, Sussex)*
19	Coaster (electric)	J. C. Turner *(Bournemouth, Dorset)*

20	Vosper Launch 1/72 scale	M. Quinn *(Englefield Green, Surrey)*
21	P.51 Mustang	M. Nicholls *(Sparkbrook, Birmingham)*
22	Bf 109 F-3 (Rumanian)	M. Nicholls *(Sparkbrook, Birmingham)*
23	AB Glider	S. M. Richardson *(Loxwood, Sussex)*
24	The *Saint Louis* 1626	C. J. Burchell *(Sutton Coldfield)*
25	S.V.A.5 W.W.1 Italian Bi-plane	D. Vail *(Fareham, Hants.)*
26	Stuart Beam Engine	M. Summerfield *(S. Ruislip, Middx.)*
27	Stuart No. 4 Steam Engine	M. Holmes *(S. Ruislip, Middx.)*
28	Power Saw	J. Juchau *(S. Ruislip, Middx.)*
29	Stuart No. 9 Engine	A. Smith *(S. Ruislip, Middx.)*
30	Early 19th Century Naval Cannon	T. Clarke *(Nr. Macclesfield, Ches.)*

CLASS WB: Any work in glass fibre or other plastic as main constituent

No.	*Description*	*Name and Town*
1	Mammoth Fair Organ on Tour	G. E. Burton *(Heanor, Derbys.)*

CLASS WD: General Craft work—musical instruments, carving, marquetry, drawings

No.	*Description*	*Name and Town*
1	Chest of Drawers with musical movement	G. M. Waugh *(Sunderland, Co. Durham)*
2	3 Stringed Dulcimer	R. Nicholls *(Witton, Birmingham)*
3	Reading Gypsy Caravan	H. Scutter *(Reading, Berks.)*
4	"Showers clearing towards evening" (marquetry)	E. H. Ives *(Ipswich, Suffolk)*
5	Tenor Banjo	R. Percy *(Aldershot, Hants.)*
6	Trinket Box	B. Klingenspor *(Harlow, Essex)*
7	A Large Gothic Temple	H. G. De Mello *(London, E14)*
8	Wild Horse	B. Hills *(Chelmsford, Essex)*
9	Nude Figure	B. Hills *(Great Baddow, Chelmsford)*
10	Circa. 1700-1930 Broad Wheeled Sussex Waggon	J. Harwood *(Luton, Beds.)*

CLASS: Schools

No.	*Description*	*Name and Town*
1	Locomotive based on *Tich* $7\frac{1}{4}$" gauge 0-4-0	Chew Valley School *(Bristol)*
2	Diorama depicting typical 1943/4 R.A.F. Bomber Base	Alleyn Court Prep. School *(Westcliff-on-Sea)*

CLASS AA: Flying Models of all types

No.	*Description*	*Name and Town*
1	Mustunt	T. G. Beatson *(Worsley, Manchester)*
2	Bowden *Mouse* Replica	P. N. Scott *(Switzerland)*
3	"Aristokrat" aerobatic	C. G. Crawley *(Hendon, NW4)*
4	Rubber-driven International contest type f/f model	J. P. Buskell *(Claygate ,Surrey)*

CLUBS, SOCIETIES AND GOVERNING BODIES

INTERNATIONAL PLASTIC MODELLERS' SOCIETY

Stand 28

The International Plastic Modellers' Society is a World-wide organisation run by voluntary committees in most countries where people follow the hobby of making plastic kits.

Founded in England at the time plastic construction kits were in their infancy, the object of the Society is to help all members, whatever their interests, to derive more pleasure from their hobby.

Beginners are welcome at all Society functions and are given every encouragement to improve their modelling as well as seek the advice of experienced members. The Society also puts on displays at Air Shows, Army and Navy Open Days, Fetes, Libraries, and other places of interest.

The Model Power Boat Association

Stand 29

The Association was founded in 1924 and has as its objects the organisation and control of events and competitions between the various model power boat clubs which are affiliated to the Association; also to promote interest in model power boats in all aspects.

From a small beginning the Association has steadily grown, and today there are over eighty clubs affiliated.

There is now a European Federation to which some seventeen countries belong. Major Championships are held every two years and a team from the Association represents Great Britain.

The craft themselves are broadly divided into three headings, hydroplanes, straight running craft, and radio control.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

Stand 30

Model flying is a sport with built-in satisfaction. Part man-and-machine, part man-versus-the-elements, it is one of the five aviation sports recognised by the Federation Aeronautique Internationale (together with gliding, para-chuting, aerobatics and ballooning); its branches require the same stamina, split-second reactions and co-ordination as other sports. Ask anyone who has flown a bout of control-line combat, duelling with a 90 m.p.h. model, trying to cut the streamer towed by an opponent. Ask the free-flight glider competitor, sprinting for ten minutes as he plays his model like a fish on its towline, while feeling for the gentle tug of a thermal. Ask the radio control aerobatic pilot, flying his model through the rigours of the international schedule of manoeuvres, while hawk-eyed judges downgrade him for the slightest flight inaccuracies.

The satisfaction comes from the fact that model flyers build their own 'sports equipment', the models with which they compete. Most, in fact, are not 'models' in the sense of being miniature replicas of man-carrying prototypes, but are highly specialised aircraft, designed to excel in one area of performance—speed, for instance, or flight duration. Most competitions are purely objective; it is performance that counts, with you and your model against the elements, and a stopwatch as judge.

Since 1922 the S.M.A.E. has been responsible for organising model flying in Britain. As well as representing the sport in local authority negotiations for flying sites, it is pressing for recognition by the Sports Council, the body which provides public money for sports and recreation.

THE NORTH LONDON SOCIETY OF MODEL ENGINEERS

Stand 39

This Society was formed in 1944 and holds regular meetings at its headquarters in Barnet.

The Society has approximately 150 members, whose interests range from locomotives, stationary steam, miniature railways, slot car racing and marine.

The Society is fortunate in possessing a track for running the steam locomotives on a half mile circuit, catering for 3½ in. 5 in. gauge locomotives and a smaller circuit which also accommodates 2½ in. gauge engines. The tracks are located at Colney Heath in rural surroundings with ample car parking facilities, and this site has been the venue for a number of rallies, particularly those for the Southern Federation of Model Engineers.

A number of well known model engineers are members, including contributors to the Model Engineer, and interesting lectures are arranged each month.

Stewards will be on duty throughout the Exhibition to answer any questions on the models displayed, which will be representative of the activities of the Society.

SOUTHERN FEDERATION OF MODEL ENGINEERING SOCIETIES
Stand 43

The Federation was formed to co-ordinate a standard safety policy throughout member clubs, also a common liability and accident insurance policy available to all member clubs. This has now been achieved and is in operation.

The Federation now promotes a Spring and Autumn Rally each year. The 1976 Spring Rally is to be held at Cambridge M.E.S. and the Autumn Rally at Brighton and Hove M.E.S.

On Sunday 4th January 1976 Chingford M.E.S. are holding a Special Open Day, ALL visitors welcome.

Stand stewards will welcome any queries on Model Eng neering.

In the Committee Room

BRITISH MODEL SOLDIER SOCIETY

The Society's stand will display items covering the whole field of military modelling, figures, guns, vehicles, tanks and other equipment, in a variety of scales

A popular feature of our display is the demonstration of various skills and techniques relevant to military modelling, such as soldering, animation, conversion, painting etc. We propose to present as comprehensive a cross section of the activities of the Society as possible, bearing in mind its many facets and contributory interests, military history, the study of uniforms, prints, A.F.V.'s and the like.

We shall extend a genuine welcome to all visitors to the M.E.E., and invite them to call at our stand where we shall do our best to answer queries and offer advice relevant to this fascinating hobby.

TRAMWAY AND LIGHT RAILWAY SOCIETY

The Society has been in active existence since 1938 and caters for those interested in the subject of tramways. One of the main sections of the Society is the Model Engineering Section and it is acknowledged that models constructed by our members are some of the finest so far built. Many of these models are displayed in operation on the layout and represent a good selection of the many cars built by our members.

All trackwork has been constructed in the workshop of one of our members as also the overhead equipment. The models are built to a scale of ¾ in. to 1 ft. and the track gauge is 3½ in. Working voltage is 24 and they are equipped for operation on the overhead wire method of current collection. Models on show are representative of London, Manchester, Belfast, and many other British systems.

Our layout is operated at this exhibition by two operators—one at each end who control the current in the wire of the car coming towards them. The overhead is suitably divided into sections and these are switched in and out by the operator as required.

5	R/C aerobatic model	A. Watson *(York)*
6	A/2 Sailplane with circle towhook	M. Dilly *(West Wickham, Kent)*
7	Control line autogyro	D. J. Davidson *(Chelmsford, Essex)*

CLASS AB: Scale flying models of all types, rubber, glider, power, control-line or radio control

No.	*Description*	*Name and Town*
1	Sopwith 1½ Strutter	A. Marshall *(Harpenden, Herts.)*
2	N.A. A.J1 Savage	M. Stockdale *(Colchester, Essex)*
3	Vought F4U-2 Corsair	R. Sharpe *(Ealing, W5)*
4	Handley Page H.P.42 *Helena*	T. G. Beatson *(Worsley, Manchester)*
5	Fokker DVII	M. S. F. Staples *(Cambridge)*
6	DH 82A Tiger Moth	R. Farrar *(Basingstoke, Hants.)*
7	Sopwith Camel	D. Banks *(Kingsbury, NW9)*
8	Canoron 1911 Monoplane	D. Banks *(Kingsbury, NW9)*
9	Bristol Scout	D. Banks *(Kingsbury, NW9)*
10	Bristol Scout	D. Banks *(Kingsbury, NW9)*
11	Bristol Monoplane Scout	A. W. Manley *(Forest Hill, SE23)*
12	Boeing B-17G Fortress	A. J. P. Briggs *(Tadworth, Surrey)*
13	Bristol F2B Fighter F/F	D. H. Kew *(Kingston-on-Thames)*
14	Dornier 24T-3s	G. W. Worley *(Kingston-on-Thames)*
15	F/F aircraft Fieseler Fi 156—Storch	J. Eggs *(Carshalton, Surrey)*
16	Nieuport II	D. Alchin *(Burgess Hill, Sussex)*

CLASS AC: Scale non-flying models

No.	*Description*	*Name and Town*
1	AV Roe Lancaster Bomber in Far East (Tiger Force)	F. W. Waller *(Watford, Herts.)*
2	Lancaster Bomber	F. W. Waller *(Watford, Herts.)*
3	Hawker Harrier	D. Gardiner *(Kingston-on-Thames)*
4	Bell Model 47G Helicopter	C. Swiecicki *(Shepherds Bush, London)*
5	Royal Malaysian Air Force Trainers Old and New	P. S. G. Bacon *(Walton-on-Thames)*
6	Hawker Harrier	A. J. Bennison *(Camberley, Surrey)*
7	Hawker Harrier	A. J. Bennison *(Camberley, Surrey)*
8	Dart Pup, Flying Flea, Tipsy B	L. H. Haynes *(Northwood, Middx.)*
9	Vickers Viking	C. L. Partridge *(Worcester Park, Surrey)*
10	VC 10 Airliner	C. L. Partridge *(Worcester Park, Surrey)*
11	Airspeed Ambassador	C. L. Partridge *(Worcester Park, Surrey)*
12	Westland Scout, Gunship Version	C. J. Smith *(Waltham Forest, London)*
13	"Moth Memories" A display group of D.H. Moths	A. F. Wollett *(Wokingham, Berks.)*
14	D.H.90 Dragonfly of Birketts Air Service	A. F. Wollett *(Wokingham, Berks.)*

15	McDonnell Douglas F-4E Phantom II	G. J. Smith *(Aylesbury, Bucks.)*
16	N/A F-100D Sabre	G. J. Smith *(Aylesbury, Bucks.)*
17	N/A P-51D Mustang	M. Small *(Aylesbury, Bucks.)*
18	N/A P-51B Mustang	M. Small *(Aylesbury, Bucks.)*
19	Northrop F5B	D. Green *(Aylesbury, Bucks.)*
20	Fokker G1A	E. J. Vine *(Bexley Heath, Kent)*
21	Mosquito	M. Pandeli *(London N16),*
22	F-104 G	P. Newman *(Greenford, Middx.)*
23	1912 Bristol Coanda Monoplane	J. A. Nicklin *(Sutton Coldfield)*
24	McDonald Douglas F15 Eagle	G. F. Wright *(Sutton Coldfield)*
25	Hunter FG9A of 45 Squadron	D. Maycock *(London, W8)*
26	P510 Mustang	S. Ray *(Bourne, Lincs.)*

CLASS AF

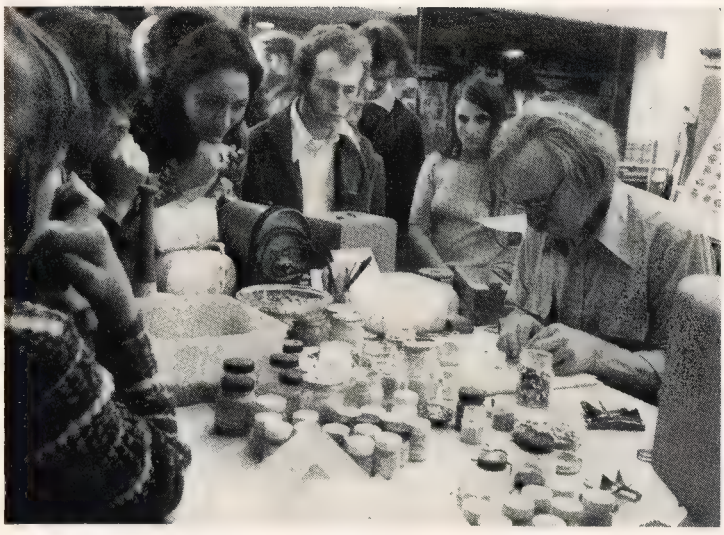
No.	*Description*	*Name and Town*
1	R/C Sherman	A. Disdale *(Wembley, Middx.)*
2	459 MHz Radio Control System	P. W. Howey *(Bath, Som.)*
3	R/C Receiver/Servos Module	Dr. J. Warner *(Malvern, Worcs.)*

CLASS: Loan Section

No.	*Description*	*Name and Town*
1	A Simple Indexing Device	M. Evans *(c/o "Model Engineer")*
2	A Milling and Drilling Attachment	M. Evans *(c/o "Model Engineer")*
3	Old Woolwich Free Ferry	P. Jenkins *(London, E16)*
4	Fowler Steam Waggon	R. H. Dyer *(Warwick)*
5	"Fowlers in Harmony" (painting)	W . J. Hughes *(Sheffield)*
6	"Last Sheaves of the Day" (painting)	W. J. Hughes *(Sheffield)*
7	Reproduction of miniature 1700 bracket clock	C. B. Reeve *(Hastings, Sussex)*
8	Sub miniature Allchin Traction Engine	K. Hobbs *(Eastleigh, Hants.)*
9	4-Column Beam Engine	T. D. Walshaw *(Westmorland, Cumbria)*
10	Review models from MM Magazine	J. Wylie *(Walworth, London)*
11	Review models from MM Magazine	J. Wylie *(Walworth, London)*

CLASS: Students Cup

No.	*Description*	*Name and Town*
1	Armstrong 12 pdr. Gun 1/5 scale	Full Time Eng. Apprentices *(M.O.D. Royal Arsenal Woolwich)*
2	Chess Set and Board	Apprentice Training Sch. *(R.A.F. Chorley)*
3	Model Makers Lathe	Apprentice Group Project *(Preston, Lancs.)*



UNI-SEX?

Evelyn Barrett, Editor of her enthusiasm hobby for all ages

WHEN we started GEM CRAFT nearly two years ago we envisaged it as a M.A.P. magazine for the ladies but time and our readers have proved us wrong. GEM CRAFT is for the whole family.

GEM CRAFT introduces you to a hobby that can be started without any initial outlay, a hobby that is inexhaustible and can lead you on to many other avenues of discovery. It can bring great pleasure, and rewards not only in enjoyment, but with a modest outlay on equipment turn into quite a paying proposition. There are many fully equipped workshops today furnished entirely from the proceeds of jewellery sold to friends and neighbours. To say nothing of Christmas and birthday presents.

You will find that your hobby adds a new dimension to holidays and brings pleasure to all the family. Indeed it is frequently the youngest member of the group who makes the best find.

Having found your shiny pebble on the beach it is disappointing to see it become dull and uninteresting when dry. The answer to this is tumble polishing. Many beach pebbles, which on English beaches can include such semi-precious stones as agate, carnelian, chalcedony, onyx and jasper or even amber, tumble well. They can then be made into unique and beautiful jewellery, to be prized in these days of synthetics and plastics.

Thanks to the recent introduction of inexpensive tumbling machines anyone with determination and patience can soon have a supply of natural gemstones.

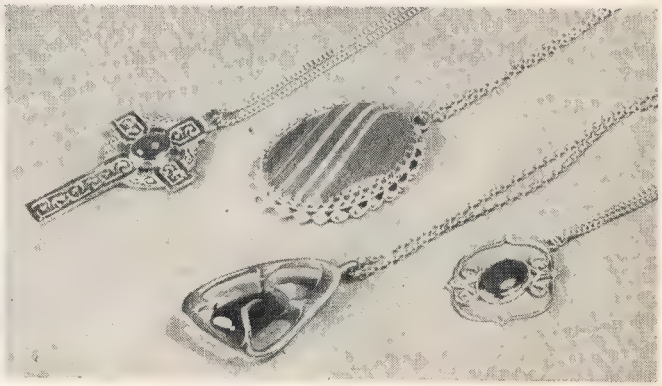
It is also quite simple to construct your own tumbler—with GEM CRAFT's help!

After tumble polishing the natural progression is to the real meaning of the word lapidary—CUTTING stones. To do this you will need a cutting and polishing machine—and then you are off—cutting and slicing your finds, making slabs, slices, pen-stands, bookends. Then on to jewellery, cutting cabochons, making squares, rounds, crosses—anything! Any shape!

If you don't feel you are ready for a machine yet you can try your hand at hand-polishing. Kits are available from most lapidary dealers.

Or you can buy some of the beautiful ready polished stones and create your own individual jewellery from real gemstones.

Other facets of GEM CRAFT to be explored are serious rock-hunting, for specimen minerals, prized for their intrinsic beauty rather than use for jewellery. Fluorescent minerals, those secret stones whose true beauty is only revealed under ultra violet lamps, and of



No! UNI-FAMILY

of Gem Craft injects some into Britain's fast growing and just everybody!

Left: These polished agate slices were easily transformed into beautiful and original jewellery with the addition of simply attached chains and leaf bails. No tools needed—just a supply of epoxy.

Above: Any demonstration of stone cutting and polishing brings a crowd of onlookers, and this one was no exception. The boys were bursting with eager questions and quite determined to start this fascinating hobby themselves.

course, that old favourite—fossils. The cutting and polishing of stones can lead you on to silvercraft and jewellery making.

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Far left: Lapis-lazuli ring and jade pendant. Both stones cut and set in silver by a beginner with no previous experience of jewellery making.

Heading: Hans Theilade surrounded by a rapt audience during one of his popular enamelling demonstrations. Hans will be in the Lecture Hall again this year.

Left: Cut and polished stones collected from English beaches set in commercial mounts

Right: Rock hunting on Barton Beach, Hampshire. A good place for fossils.

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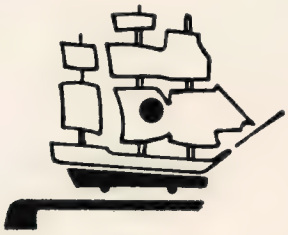

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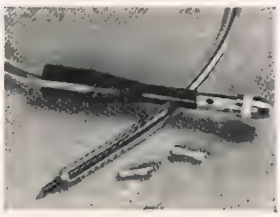

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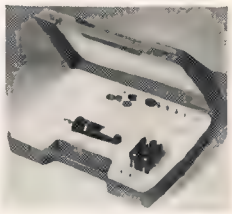

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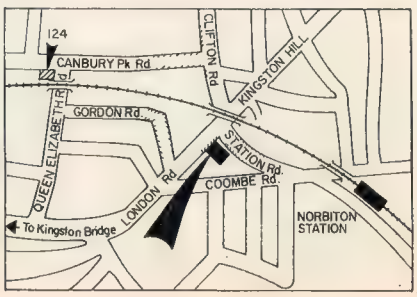

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JACK BARNARD OFFERS A RUN UP ON THE HOWS AND WHYS OF HELICOPTER FLIGHT

Typical of the kind of small and practical R/C Helicopter now available is the Schluter Helibaby seen here flown by Dave Nieman.

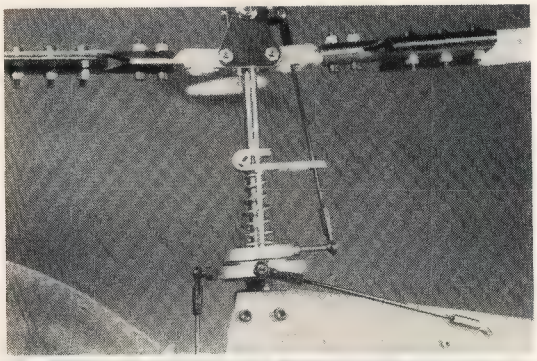
EXPERIMENTS with rotary winged aircraft may be traced as far back as the days of Leonardo da Vinci, but successful flights with full size helicopters were not achieved until 1936, and the first really practical aircraft of this type was built in America by Igor Sikorski in 1941.

In 1968, Dr. Dieter Schlüter became the first modeller to achieve sustained and controlled flight of a model helicopter and, in 1970, set two world records for duration and distance. Now, five years later, the radio controlled model helicopter is a familiar sight at model aircraft rallies throughout the world. As the aerodynamics of, and the aerodynamic forces encountered by, the helicopter differ somewhat from those encountered by fixed wing aircraft, the question is often asked, "How does it fly?" The Music Hall comedian type answer "With great difficulty" is perhaps not as stupid as it sounds, considering the very many difficult problems encountered during the evolution of rotary winged aircraft, the autogyro and helicopter.

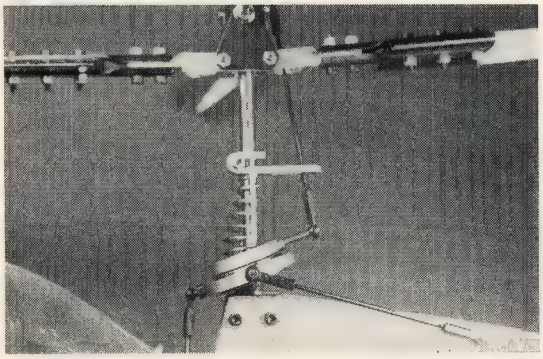
The autogyro differs from the helicopter in that it is driven forward by a conventional engine and propeller, and the blades of the lifting wing, or rotor, are rotated aerodynamically as a result of their forward motion through the air; while in the case of the helicopter, the lifting rotor is driven by an engine, and directional movement achieved by design of the rotor control.

"How does it fly?" Simply, by replacing the fixed wing of the conventional aircraft with a system of rotating wings which develop, whilst rotating at speed, the lift necessary for flight. Perhaps before proceeding we should ascertain that readers fully understand the way in which an aircraft wing, or, in the case of the helicopter, the lifting rotor, produces lift. Fig. 1 shows, in section, a typical lifting surface, or aerofoil, the upper surface of which has a greater curvature than the lower. Suspended in still air as shown, the air pressure would be equal on all surfaces; this pressure would, of course, be normal atmospheric pressure, approximately 15 lb. per square inch.

Fig. 1(a) shows the aerofoil moving through the air and, due to the curvature of the upper surface, the velocity of the airflow is increased, while the flow remains constant over the lower surface. If the speed of air is increased, as when it passes over an aerofoil section, its pressure is decreased. One example of this is the behaviour of an unfastened door in a draught, where initially the draught forces the door slightly open and enters through the resultant gap. The increase in air speed as the air is forced through the gap causes a drop in air pressure, or a "suction", which causes the door to slam shut. The opposite occurs if we decrease the speed of the airflow: i.e. pressure increases, and Fig. 1(b) shows that by increasing the angle of attack of the aerofoil to the airflow, air velocity is decreased by the angle of the lower surface. The combination of the decreased air



Swash plate shown in neutral position. Main rotor blade angle will remain constant throughout circle of rotation. Note "Stay" preventing rotation of lower part of Swash Plate.



Operation of the Cyclic Pitch "fore and aft" control has tilted the Swash Plate, resulting in a variation of main rotor blade angle throughout the circle of rotation of the rotor.

pressure due to increased air velocity of the aerofoil's upper surface and increased pressure due to the lowering of the velocity on the lower surface produces the upward force referred to as "lift".

Let us now imagine the helicopter at rest on the ground, with lifting rotors stationary, where air pressure over the rotor's aerofoil section is consistent with Fig. 1. Now we start the engine which drives the rotors, and gradually increase their speed of rotation. Lift will, of course, increase as the speed of the airflow over the aerofoil increases, and if we now increase rotor speed to the point where the lift obtained is greater than the helicopter's weight, the aircraft will be lifted into the air.

With the wheels of the helicopter free from ground contact, torque reaction of the rotors will turn the helicopter about the rotor's axis in the opposite direction from which the rotor blades are turning, and it is to counteract this torque reaction that the small rotor is mounted vertically on the rear fuselage of the helicopter. This small rotor produces lift from its aerofoil section in the same manner as the main lifting rotor, and is driven by the same engine. As the lift of the "tail" rotor is inclined horizontally, we refer to it, not as lift, but as "thrust"; and the amount of thrust produced can be controlled by the helicopter pilot to counteract the torque of the main rotor—Fig. 2.

We now have the helicopter in the air with the fuselage under control directionally, and will assume that we have adjusted the speed of the main lifting rotor, by using the engine throttle as required, to produce sufficient lift to balance the weight of the helicopter so that, in still air conditions, the aircraft is hovering at a fixed point above the ground—Fig. 3.

Directional movement is the next step and, in order to obtain this, a force must be produced in the direction in which we wish the aircraft to move. Note that in Fig. 3 the lift is acting at right angles to the rotor, vertically upwards, and the weight is acting vertically downwards. If we now tilt the rotor as in Fig. 3(a), the lift, which still acts at

Fig.1. Aerofoil stationary.

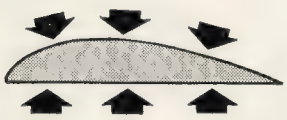
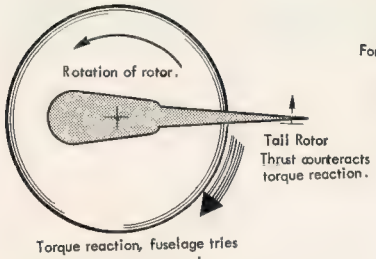


Fig.1a. Aerofoil moved through air.

Fig.1b. Aerofoil with positive angle of attack to airflow.

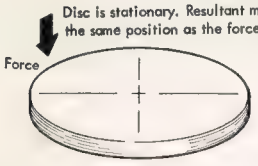
Fig.2. Torque reaction

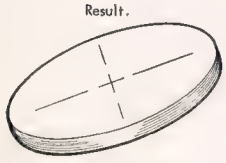


Torque reaction, fuselage tries to spin about rotor axis in opposite direction to rotor.

Fig.4. Law of Gyroscopic Precession.

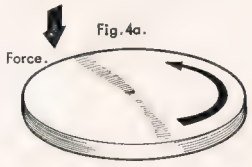
Disc is stationary. Resultant movement is in the same position as the force applied.





Disc is rotating. Result occurs 90° in direction of rotation from point at which force is applied

Fig.4a.



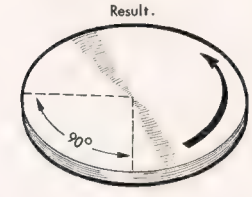
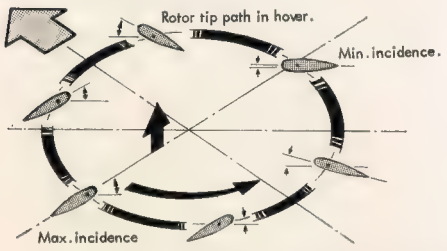
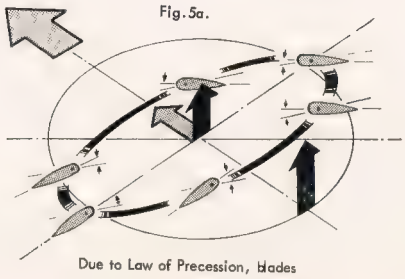


Fig.5. Result of Cyclic Pitch change

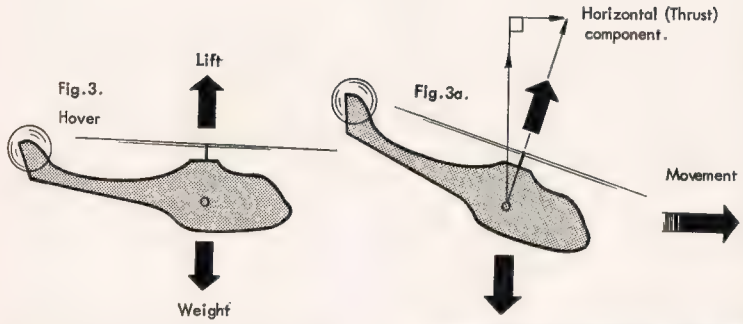


Forward movement of control by pilot increases incidence on left hand rotor blades, reduces incidence on right.

Fig.5a.



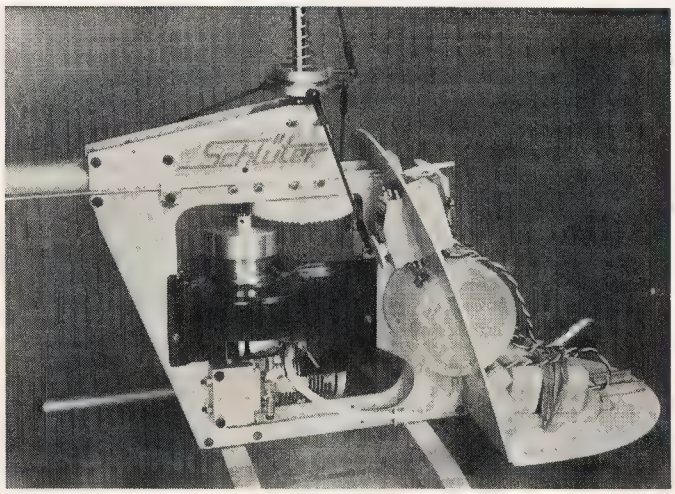
Due to Law of Precession, blades react by tip path tilting forwards.



right angles to the rotor, is also tilted, producing a horizontal force to move the aircraft in the direction of the tilt. The plane of rotation of the rotor can be tilted either by tilting the rotor axis itself relative to the helicopter fuselage, or by varying the angle at which the individual blades of the rotor meet the airflow through certain sectors of their plane of rotation. The second method is most common in use and, by this means, the rotor blades, which are hinged at the centre of the rotor, can be made to rise at one part of their rotation, or circuit, and sink on the opposite side, producing the effect of tilting the rotor: this is known as cyclic pitch variation—Fig. 5.

Cyclic pitch variation is effected by means of a swash plate which is mounted on a universal joint at a point on the main rotor drive shaft between the power unit of the helicopter and the main rotor. It is constructed of two linked plates; the lower plate remaining stationary in orbit, but under control of the helicopter pilot, can be tilted to any point of the circle of rotation of the main rotor. The upper plate of the swash plate unit is connected to the rotor head and rotates with the main rotor, but tilts with the lower plate; and this is so arranged to alter the angle of the main rotor blades as required to produce a horizontal force in any selected direction.

On full size helicopters, and on some of the more sophisticated models, an additional control of rotor blade angle is used, known as collective pitch control. Here the rotor blades are connected to the engine throttle control and movement of the throttle varies the pitch of the blades simultaneously, and this combination—forward speed and rotor blade angle—controls the amount of vertical lift. However, it is not popular with the greater proportion of model helicopter pilots who prefer in general to use a fixed pitch rotor, set, with the swash plate neutral, to the angle of attack of the rotor blades best suited to the area of their lifting surface and power of the motor used to drive them. I have referred to a fixed pitch rotor; this pitch, or angle, of the rotor blades with the swash plate in the neutral position is, of course, the average angle, as, when the swash plate is tilted, the angle at which the rotor blades meet the airflow will vary throughout their circle of rotation.



"Mechanics" of the Schlüter "Heli-Baby", showing the actuating rods from radio control servo's to Cyclic Pitch control arms on Swash Plate and rear rotor control actuating rod.

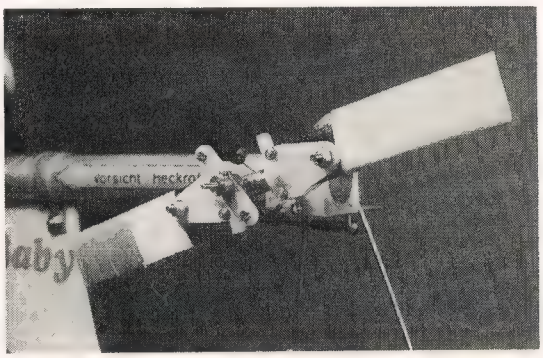
Let us now look at some of the problems encountered in the development of the helicopter, and how these were overcome. Firstly, we will consider the case of the advancing blade. Imagine the helicopter moving forward in flight, the main rotor turning at a constant number of revolutions per minute (RPM). It will be seen that the speed of the forward moving blade relative to the airflow over it will be rotor speed plus the forward speed of the helicopter; while the retreating blade on the opposite side will have a lower speed relative to the airflow as it must be minus the forward speed of the helicopter. Consequently, the lift and drag of the rotor blades vary considerably during each rotation and this could cause toppling of the rotor axis if the blades were rigidly attached to the rotor shaft. The effect of the advancing blade can be overcome by hinging the individual blades at the root, so allowing them individually to rise and lower when affected by varying lift. The method most common in use, however, is to interconnect the blades rigidly and using a "teetering" hinge in the rotor head; then, as the advancing blade rises due to the increased lift encountered through its increase in airspeed, the retreating blade is moved downward. The effect of moving downward results in the blade meeting the airflow at a higher angle of attack, thereby increasing the lift of that blade, counteracting the increased lift of the advancing blade.

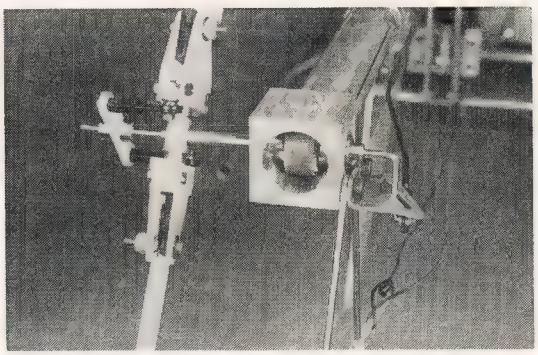
One of the greatest difficulties which had to be overcome during the design of the helicopter was the gyroscopic effect on the main lifting rotor. I suspect that all, or nearly all of us, have at some time or other played with a toy gyroscope, and understand the gyroscopic principles and law of gyroscopic precession. Briefly, the gyroscopic principles apply to any rotating mass such as a spinning wheel, flywheel, or propeller, and the main principle is "rigidity", or the tendency of the spinning mass to resist any changes in its plane of rotation. Precession is the reaction of the rotating mass, or gyroscope, to any force applied in an attempt to change its plane of rotation. Fig. 4 shows a disc at rest, balanced at its

centre, which will react to an external force at the point at which that force is applied. Fig. 4(a) shows the disc spinning, and it has now become a gyroscope; which, when subjected to an external force, will not react at the point of the applied force, but at 90° to that point in the direction of rotation of the disc. This is the law of gyroscopic precession, and as the rotating rotors of the helicopter can be said to be a gyroscope, this law must be taken into account when a force is applied to tilt the rotor in the direction we wish the aircraft to move. We overcome this problem by simply obeying the law, and if we wish to tilt the rotor forward, we arrange the point of maximum lift of the rotor blades to occur at the side, 90° ahead in the direction of the rotation of the blades—Fig. 5(a). The point of maximum lift is, of course, the point where the maximum of the external force is applied to the gyroscopic rotors, and not producing a reaction where applied but at 90° in the direction of rotation, thus tilts the rotor forward.

"What happens when the engine fails in flight? Will the helicopter crash?" This question would, I am afraid, take more space than is available to explain fully the aerodynamic forces acting upon the rotor blades during transition from powered rotation to autorotation. In simple terms, however, the full size helicopter pilot, having collective pitch control, would, in the event of engine failure in flight, reduce the angle of attack of the main rotor blades to a point where they would rotate aerodynamically in the same way as the rotor blades of an autogyro, and the aircraft would land quite safely. An experienced radio controlled model helicopter pilot flying a model fitted with collective pitch could, in the right conditions, land his model safely. This manoeuvre would, however, require much practice, and to break expensive models practicing for an emergency which might never occur . . . I can state, however, without fear of contradiction, that a model helicopter fitted only with cyclic pitch control will, in the event of engine failure in flight, descend vertically under the force of gravity, and if the rotor is turning at all, it will be backwards!

"How difficult is it to control a radio controlled model helicopter?" It is the most difficult to operate of all radio controlled models, requiring continuity of training and constant practice. The four controls involved—rear rotor control, fore and aft cyclic control, lateral cyclic control and motor control—are used continually and simultaneously during flight. I will not deny that it is possible to see a first class pilot place his radio transmitter on the ground while the model hovers of its own accord, but only under very favourable weather conditions; and we must realise that, even under ideal conditions, in order to bring the helicopter to the hovering position and trim the controls accurately, to obtain a sustained hover requires great skill, and that simultaneous movement of controls is necessary to bring the model to that point and to return it safely to earth.





Tail Rotor assembly of Schlüter "Heli-Baby" Radio Control model helicopter, showing method of control of rotor blade 'pitch" angle.

Right: proof positive of the R/C Helicopters' wide and growing popularity is this collection seen at an R/C helicopter fly-in at RAF Odiham, Hants, last July where chopper enthusiasts met to share their common interest.

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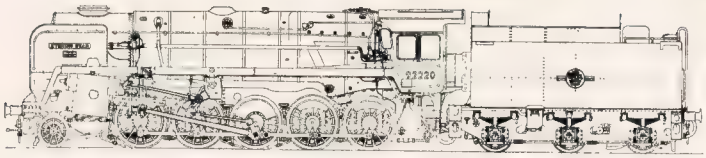

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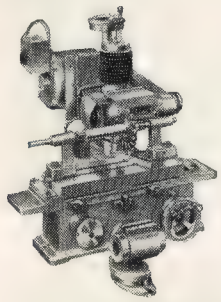

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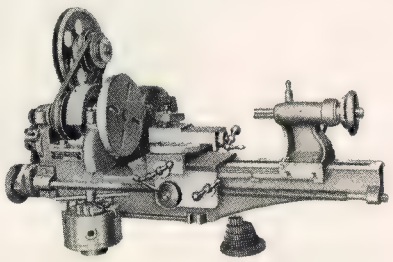

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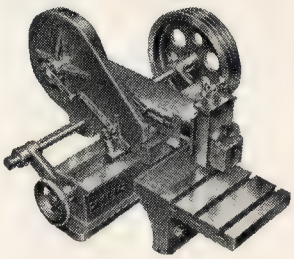

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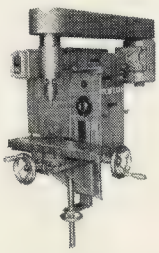

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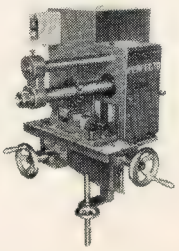

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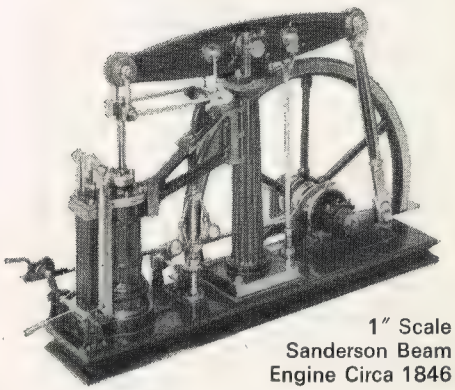

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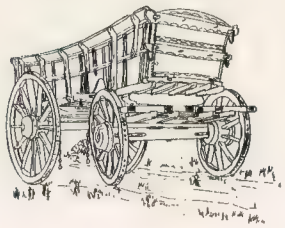

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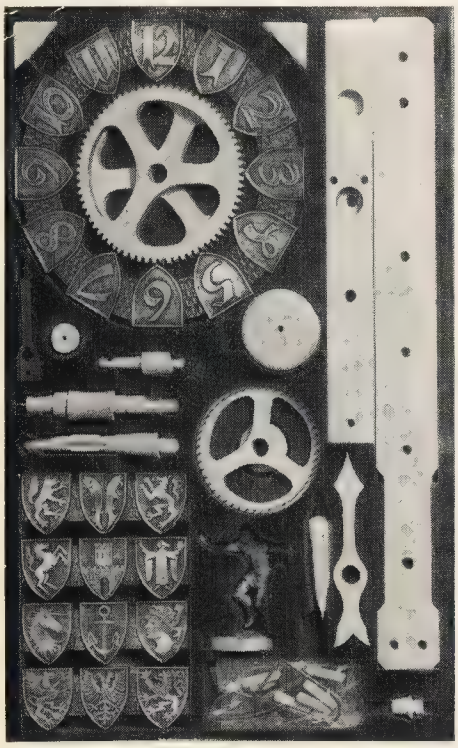

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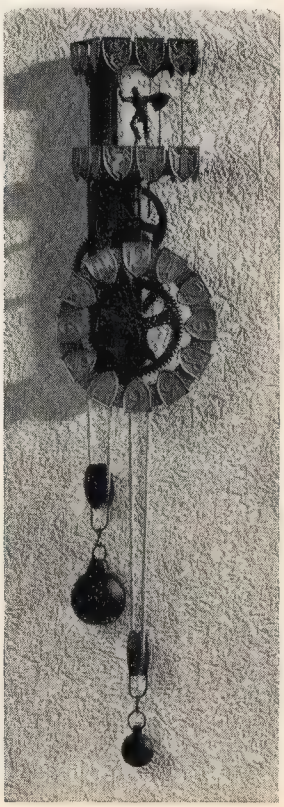

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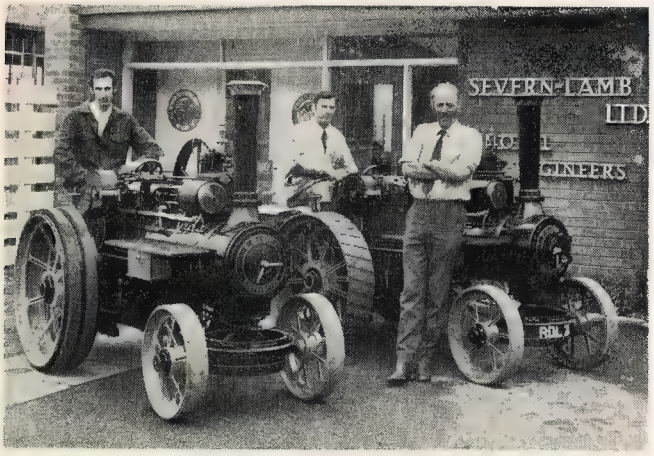

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ELECTRIC POWER

—NOW A PRACTICAL PROPOSITION FOR AEROMODELLERS? ASKS PETER RICHARDSON

FOR MANY newcomers to aeromodelling, one of the greatest handicaps to overcome is learning how to start and operate miniature two-stroke engines—indeed to many, the internal combustion motor soon earns the name-tag of "infernal combustion motor"! However unjustified this accusation may appear, it must be admitted that model aircraft motors do have drawbacks —they need special (and expensive) fuels, a certain "knack" to start unless a heavy and cumbersome electric starter is employed, and in the case of glow plug motors one must also have a 2 volt starter battery. Once the beast is running, then we discover yet more disadvantages: mainly oily exhaust fumes and of course the ever present problem of noise. Lots of it. Then, even when these troubles are overcome, there can be difficulty in obtaining a consistent engine run, which needs careful setting of the carburettor and location of the fuel tank to eradicate. Admittedly, an experienced aeromodeller takes all these items in his stride and soon finds that the high horsepower available, low weight and general reliability of the engines are much to his taste—but is there a simpler alternative?

The direct answer to this is a confusing yes and no! For certain applications the modern diesel and glow engines are supreme, but electric power is now a commercial reality, and it is not difficult to predict a large following for this type of propulsion in the near future.

The advantages? Many—the most important surely is the lack of noise. As more and more people take up the fascinating hobby/sport, it becomes increasingly difficult to find suitable flying sites which are not bordered by acres of housing. If there is one thing that John Citizen enjoys, it is a quiet week-end's relaxation—and this is hard to obtain when a model flying club uses land adjacent to his home. There are thus two alternatives to the model flyer in this age of increasing noise awareness—either find a flying site sufficiently remote from civilisation, or to reduce the noise level. While attempts are continually being made to provide more efficient silencers for model aircraft motors, there is no way in which they will ever equal the near-silent electric motor. Thus electric propulsion could mean more flying fields, much closer to home—flying from the local park would be quite a practical proposition.

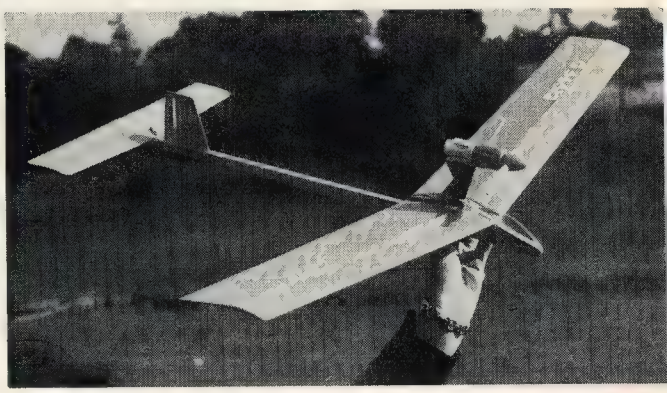
Secondly as no fuel is burned, the models do not become oily and thus last longer (providing one avoids making rather too harsh a contact with Mother Earth of course . . .) and one is saved the bother (and weight) of applying a coat of fuel proofer to the model concerned. Finally, there is absolutely no problem in starting the motor, it being merely a question of turning a switch.

Sounds good doesn't it? But before you reach for your cheque book, let's also look at the black side. Chief enemy of electric flight is weight—not so much of the motor itself, but of the batteries needed to operate it. For example, a sports 1.5 cc glow plug engine complete with silencer, propeller and tank would weigh no more than 6½ ounces, whereas the electric equivalent tops the scales at 15 ounces plus. Radio control flyers would find another snag—an electric unit is either "on" or "off"—speed is very difficult to vary, whereas glow plug motors are available with very efficient throttles, capable of giving a speed range of around 2-14,000 rpm

Further, the batteries used for power are special rapid-recharge nickel cadmium cells which are expensive, and take approximately 15 minutes to recharge from a twelve volt accumulator. Thus, whereas one can be airborne with a 1.5 cc glow plug engine for a total cost not exceeding £16.00 (engine, prop, tank and starter battery) the electric equivalent would be at least £46.00 (motor, prop, batteries plus recharging battery and charger). Offsetting this of course is the fact that the glow engine would need fuel and spare glow plugs to keep it operating.

Still dithering between silent and noisy flight? Not surprising really, there are many factors to consider, but let's now look at the practical application of commercial units. Basically, electric units are produced for three main forms of flying: radio control, free flight and round-the-pole so these will be dealt with in turn.

Heading:
Graupner's Mosquito kit with Electroprop Jumbo motor.

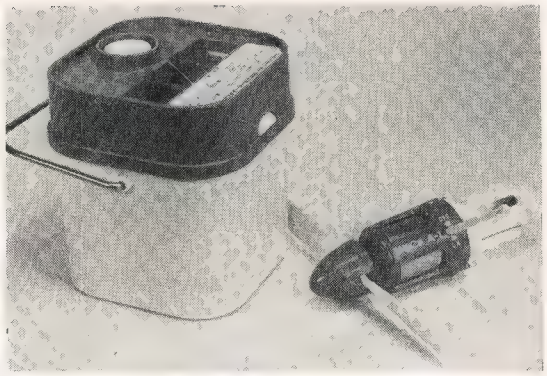


Right: Full size drawings for this free flight Mabuchi A-1 power appear in December issue of AEROMODELLER.

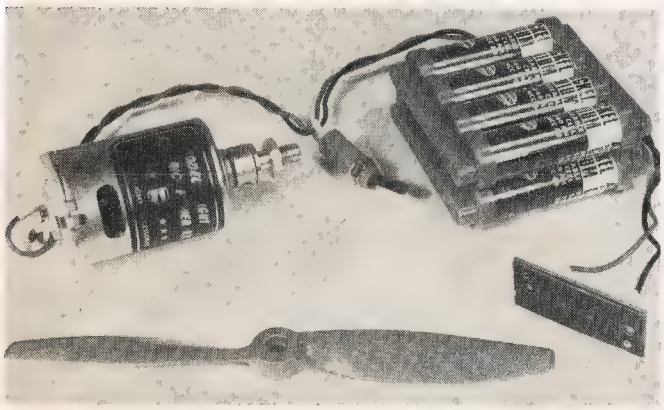
Radio Control

This is the area in which most of the drawbacks to electric power are most obvious. As the electric system has a poorer power-to-weight ratio, the units available are chiefly intended to be installed in light weight models, where power is not the main criterion. For example, *Graupner* produce three kits designed specifically for electric power, these being based on aircraft which are in essence power assisted gliders. The aircraft have either one or two motors installed and are intended to provide a steady but slow climb to a good altitude, when the motor(s) may be stopped, the large propeller(s) folding back to reduce drag while the model is flown as a sailplane. As altitude is lost, the motor(s) are switched on and the model climbs once again. The large wing area of the models enable the high pay-load of the batteries to be carried without adversely affecting the glide—the motors concerned being geared units, used to turn large diameter propellers at relatively low rpm.

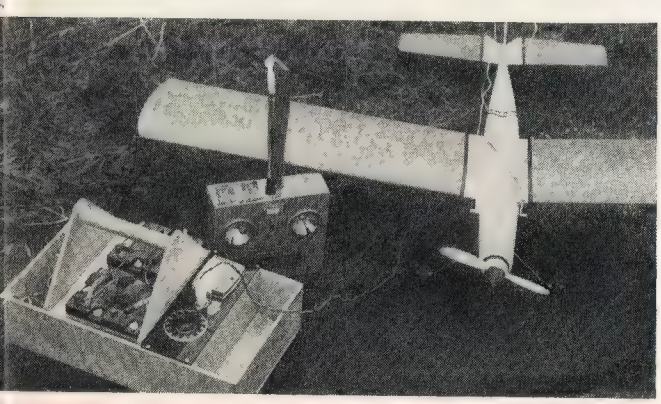
A different approach is employed by the American *Astro Flite* company, and the British *Model Flight Accessories* concern, both of whom supply units designed for "normal" sports-type radio control models. These units use direct drive to the standard-type propeller and provide sufficient power for limited aerobatics. In order to give the models reasonable performance, they must by necessity be of light construction to help counteract the weight of the batteries. Lack of throttle control will be noticed more by users of this type of motor, but at least the operator can stop the motor at will in order to effect a landing.



Mabuchi A-1 motor for free-flight models. Plastic box houses four 1.5 volt V2 dry cell batteries which provide power source for recharging the nickel cadmium cells mounted behind the motor.



British system by Model Flight Accessories. This unit with eight rapid re-charge 1.2 volt cells drives a 7 x 4 in. propeller and will fly a lightweight sports-type radio controlled model.



American Astro Flite motor fitted to a sports type r.c. model, recharged via motor cycle batteries and charger built into neat carrying box. Recharge time 15 minutes: flight 10 minutes.

Free Flight

There are two units at present available in the U.K. designed specifically for free-flight use. For this application they are almost perfect and could be a serious challenge to the well established small i.c. engines, as the weight is quite acceptable and the power adequate.

The Monogram E-Power Module is in fact basically the same unit used in the Mattel *Superstar*—the first commercially available ready-to-fly electric airplane. The geared engine weighs just $2\frac{1}{2}$ oz. complete with a 7 in. diameter propeller and miniature re-chargeable batteries, and although a little bulky, may be quite easily fitted to a model. It is recharged via a 6 volt lantern battery (such as an Ever Ready Type 996) in 3 minutes and this provides around 45 seconds of thrust—quite sufficient for free flight use.

In contrast, the Mabuchi A-I engine uses direct drive to the $4\frac{1}{2}$ in. diameter prop, which results in a more compact unit, weighing just $\frac{1}{4}$ oz. less (i.e. $2\frac{1}{4}$ ounces *including* batteries). This motor gives a maximum of 40 seconds thrust after a 5 minute charge from four U2 dry cells, and is easily mounted in a model.

Both of these motors are quite capable of giving good performance when installed in models of up to 36 in. span, and may be compared with a 0.5 cc diesel for power—and virtually the same all up weight. The length of the power run is quite sufficient, and should one wish for a shorter "power on" time, then this may be adjusted by the amount of charge given to the button cells. Certainly as far as the smaller free

Harry Butler's superb Tiger Moth flying r.t.p. at 1975 Model Engineer Exhibition. Also flies free flight.

flight sports and scale models are concerned, electric power is a very real alternative, provided the all up weight does not exceed 5 oz. if best performance is required. As for cost, the two electric units mentioned cost between £5 (Monogram) and £7.50 per complete system, while a small diesel with tank and prop (but no silencer) would be around £4.50. The only operating costs involved with the electric system would be replacement dry-cells for re-charging, but these are of course offset by the fact that the diesels consume fuel which costs around £1.00 per pint.

Round-the-Pole

For this type of flying—as demonstrated at the Model Engineer Exhibition—the electric motor has no equal! It is, of course, clean, quiet and reliable. The battery weight problem is side-stepped as the current is taken down the tether-lines from the pylon to the model, leaving the power supply ground-based. In addition, throttle control is very simple to arrange—which is why the i.c. motor just cannot compete. Motors may be geared to drive the propeller direct, and the result is low-cost motors with ample power for models of up to 4 feet span (multi-engined scale models have flown most successfully) which may be flown indoors or in your back garden on lines from 10 to 40 feet in length. Simple aerobatics are possible just by utilising the throttle control.

* * *

In this brief resume of the increasing popularity of electric power for the aeromodeller, we have tried to point out the virtues of this relatively new introduction. Summing up, it could be said that for free-flight and round-the-pole models the units are fully practical and *need* little or no future development (that does not presume that there will not be any—just that at present the units are completely practical). In the radio control fields we applaud the advances already made by the commercial concerns and look forward to even better and smaller batteries which no doubt modern technology will soon produce, as this is the major factor that has made electric power the success it is today. And finally—whatever price these super-power rechargeable batteries and motors eventually retail at, we expect them to find a substantial number of modellers willing to purchase them, for in essence, what price is silence? If silent power means continued use of existing flying fields as well as in the opening up of newer sites, then we can hardly afford *not* to utilise it.

* * *

For further information on the various electric power systems, we suggest you contact the following manufacturers/distributors.

Radio Control:

Graupner: distributed by Ripmax Ltd., Ripmax Corner, Green Street, Enfield, BN3 75J.

Model Flight Accessories: MFA, Mill Lane, Worth, Deal, Kent.

Astro Flite/Multiplex: distributed by Crescent Product (Burnham) Ltd., Springfield Industrial Estate, Maldon Road, Burnham-on-Crouch, Essex.

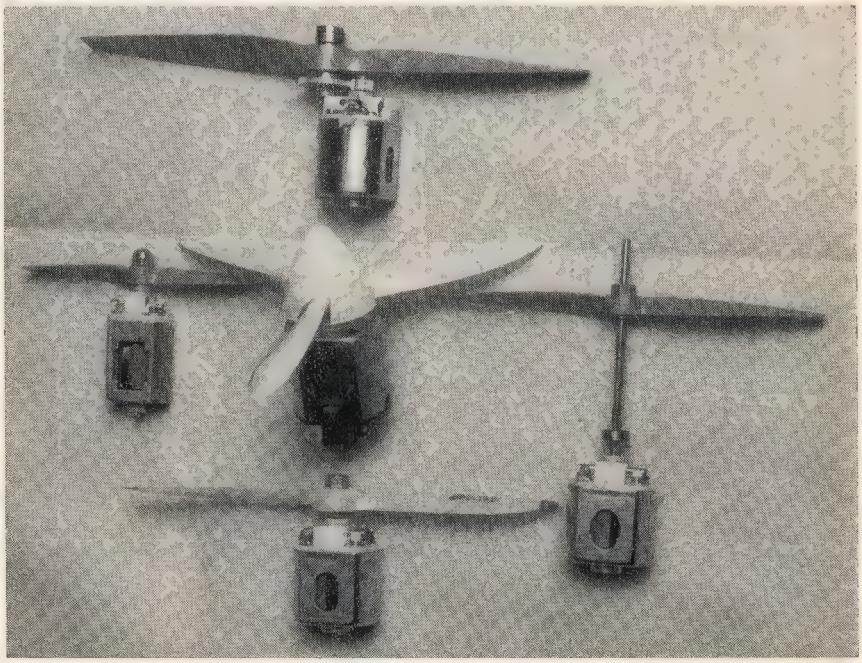
Free Flight:

Mabuchi A-1: distributed by Ripmax Ltd., Ripmax Corner, Green Street, Enfield, BN3 75J.

Monogram E-power: distributed by A. A. Hales, P.O. Box 33, Harrowbrook Road, Hinckley, Leicestershire LE10 3DN.

Round-the-Pole:

Johnson/Mabuchi and: distributed/manufactured by Harry Butler (Models), Harry Butler (Models), Field Cottage, Colchester Road, St. Osyth, Essex CO16 8HB.



A selection of motors suitable for round the pole flying, as supplied by Harry Butler (Models) Ltd. Options include geared motors, extended drive shafts, and various sizes. Prices from £2.

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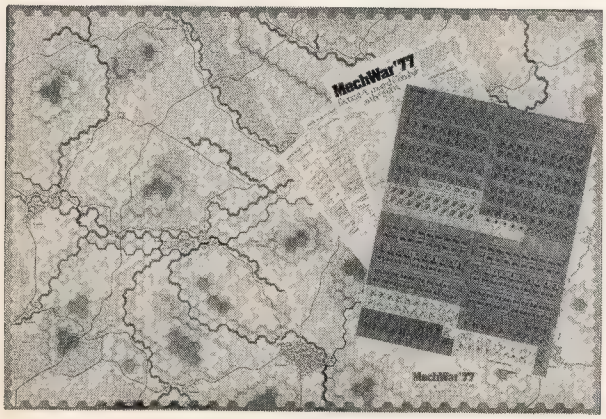
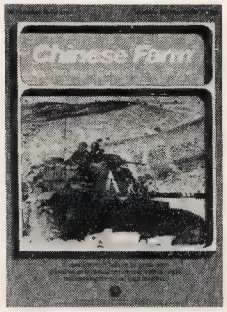
As a background to this game, a future history was written postulating a Soviet attack on the NATO forces in Germany. Derived from this history are eight scenarios which depict various elements of the Soviet 2nd Guard's Tank Army in action against the American VII Corps. The map for this game is drawn from an actual section of South-Central Germany, approximately 20 klicks northeast of Wurzburg.





Chinese Farm The Sinai, 15-20 October, 1973

A few miles east of the Suez Canal raged the most crucial battle of the Yom Kippur War. It was near a Japanese agricultural center, dubbed the "Chinese Farm", that the Israelis fought off a concentrated Egyptian counterattack. The conclusion of this battle enabled the Israelis to cross the Suez Canal in force and break the stalemate in the Sinai.

The physical components of all games are generally similar, consisting of a playing map printed on cardstock or heavy paper (usually 22"× 35"), 100 to 400 die-cut, cardboard playing pieces, and complete rules. Standard & Quad Games are individually packaged in a specially designed, multi-compartmented plastic tray with a handsomely illustrated cover.

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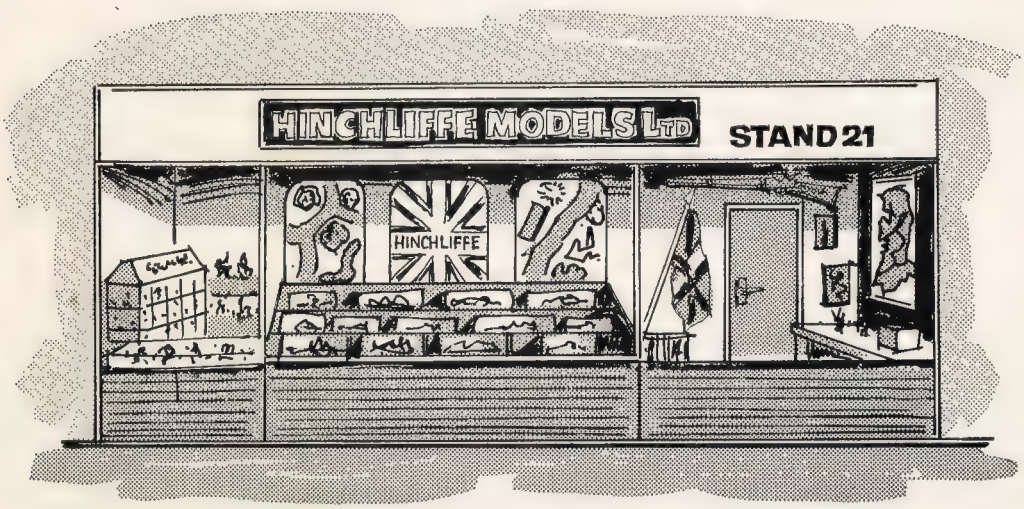

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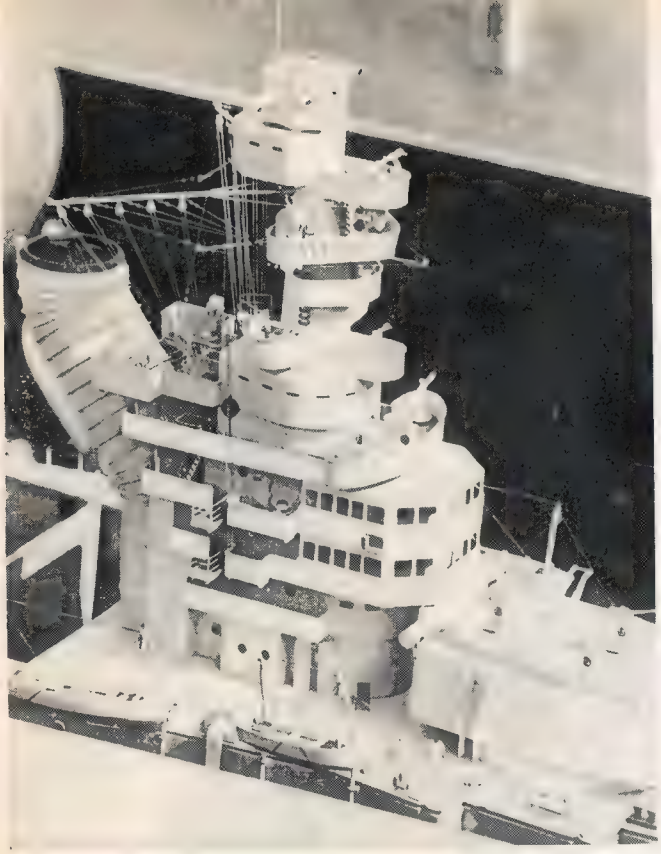
NAVIGA at

Above: These three tugs (two from MAP Plans!) and gunboat formed part of the demonstration team event, Class F6, by Dutch competitors—see action picture opposite. Spectacular displays are part of the bi-annual Naviga European Championships.

Left: Multi-boat racing with 10cc. engines. Class FSR 15, provided some of the most exciting watching at Welwyn. Six boats racing together at around 40 m.p.h. is standard. Here the ultimate winner, *Mistral* from West Germany, duels with a Swedish boat.

Below: One of the fine Russian scale warships in Class EK, straight running, is sent off towards the bull 60 metres away. The performance of these models, including scale speed, is added to points awarded in static judging to arrive at the overall winner.



Above: A West German entry in radio scale with a fine model of *Ruhr*, a Rhein class armed depot ship currently in the German Naval Reserve. Such models are required to steer round a tricky course, including moving astern and docking, as well as being judged statically.

Left: The sort of detail which is found in scale models in both the E (straight running) and F2 (radio) classes is typified by this close-up of an East German model of a Russian cruiser. Eastern Europeans are particularly strong on scale model building.

WELWYN

Right: A British multi-racer; note the prominence of the tuned pipe exhaust, which boosts engine performance. The British provided some 70 competitors and won 21 medals out of a total of about 500 entries and 87 medals shared among sixteen nations.

Below: Typical of the set-piece demonstrations which have enormous spectator appeal is this gunboat attack on a towed oil rig. The tugs extinguish the fire and reconnect their towlines to retrieve the rig. This Dutch entry did not make the top three but pleased the crowd.

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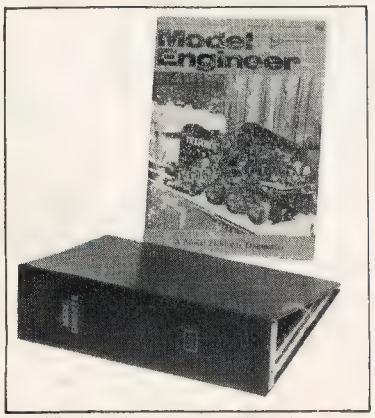

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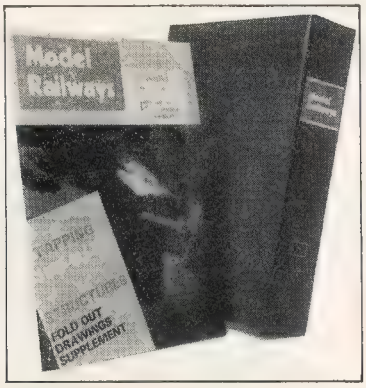

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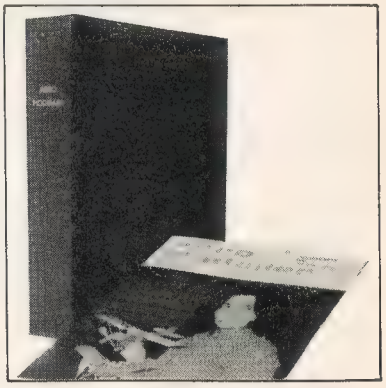

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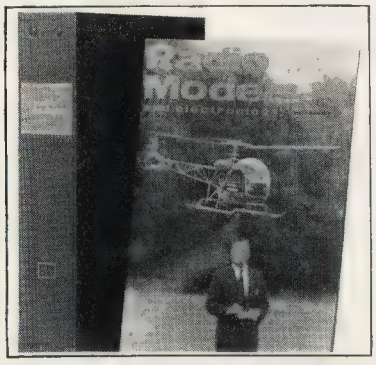

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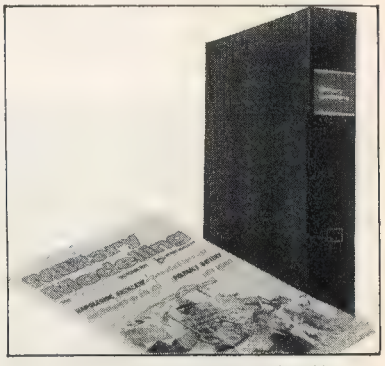

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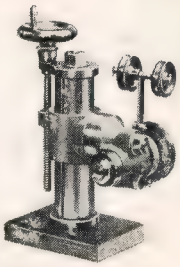

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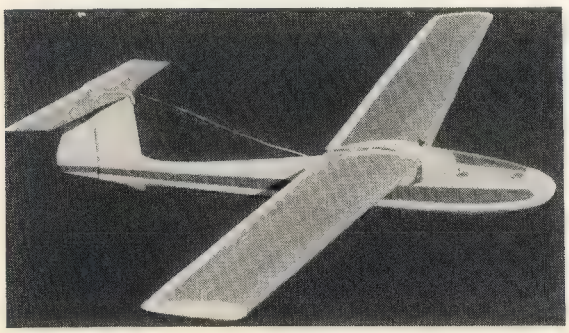

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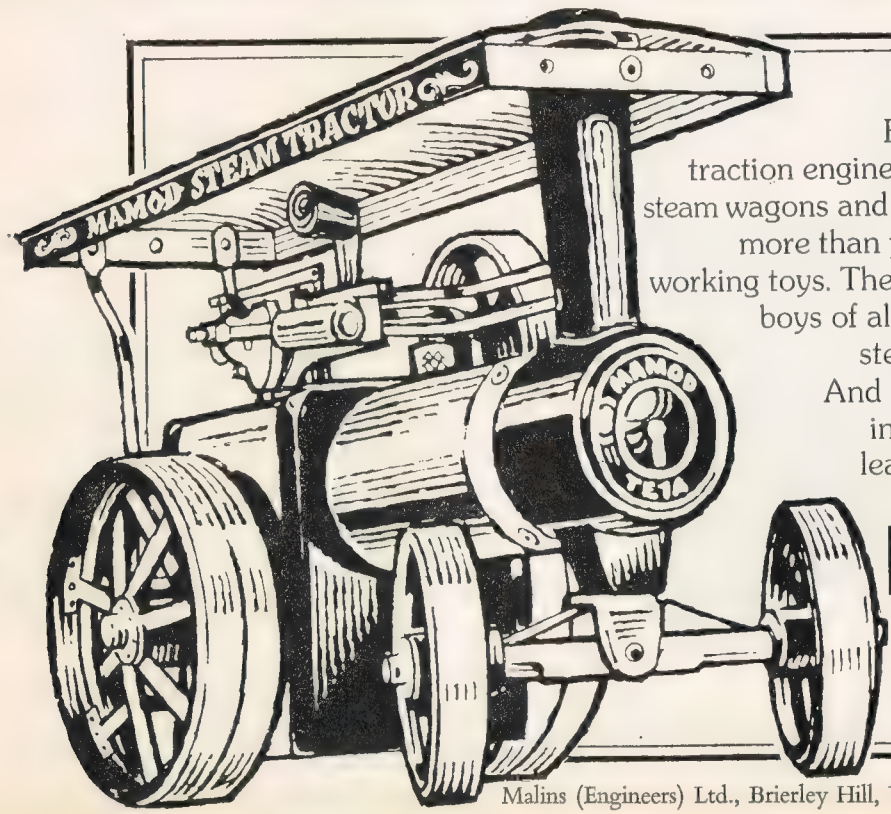

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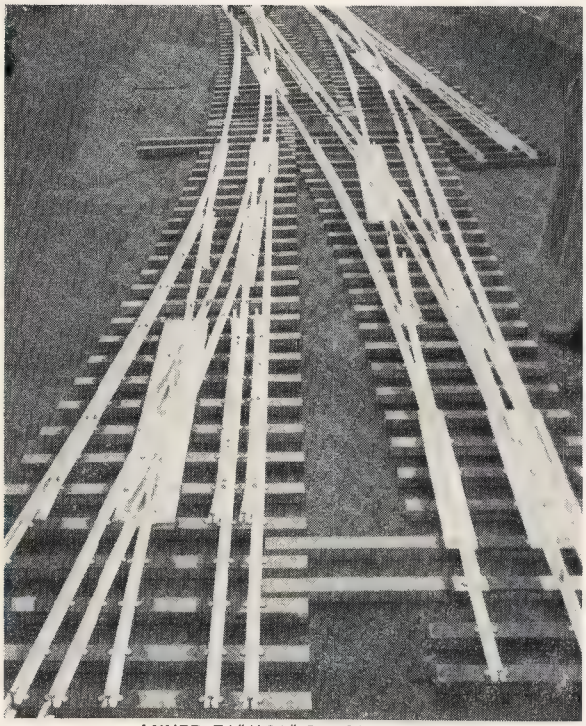

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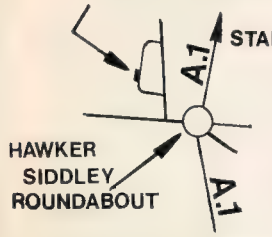

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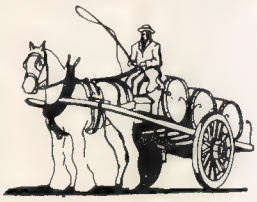

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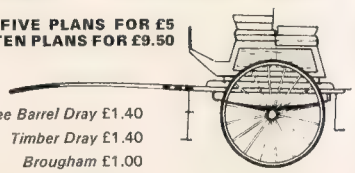

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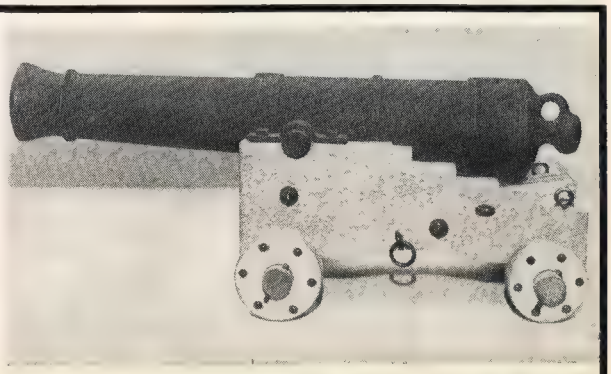

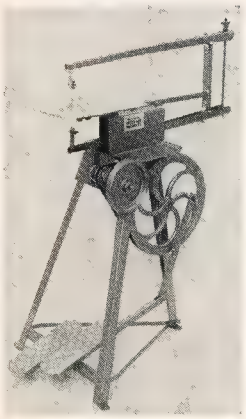

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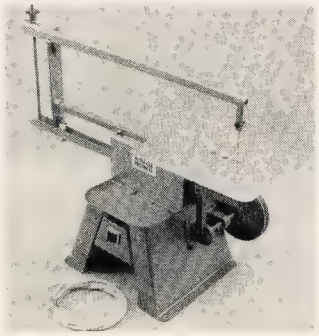

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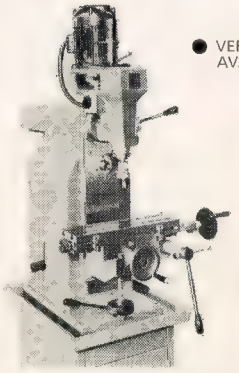

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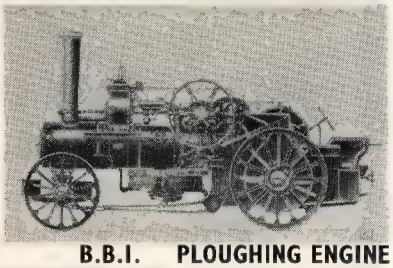

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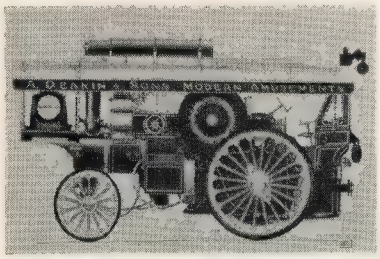

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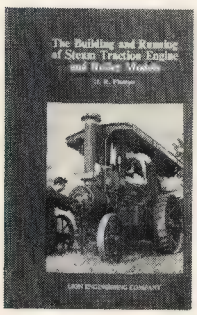

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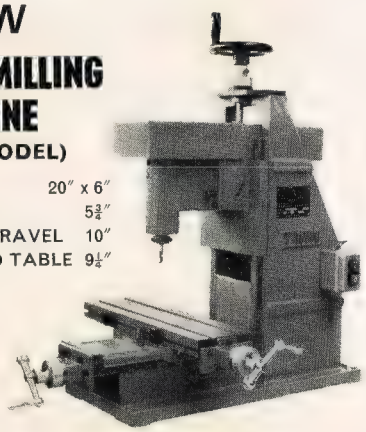

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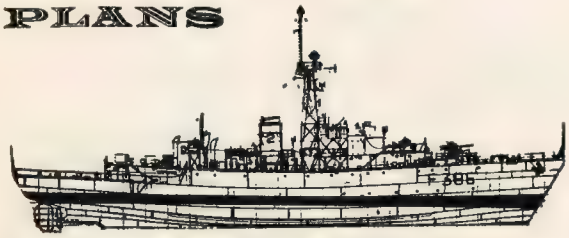

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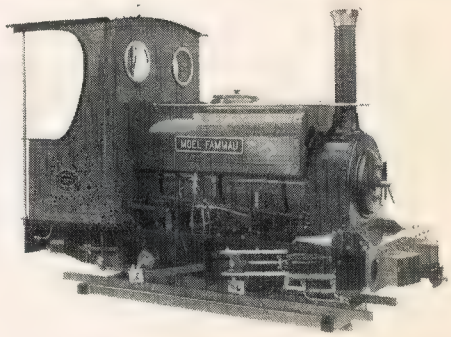

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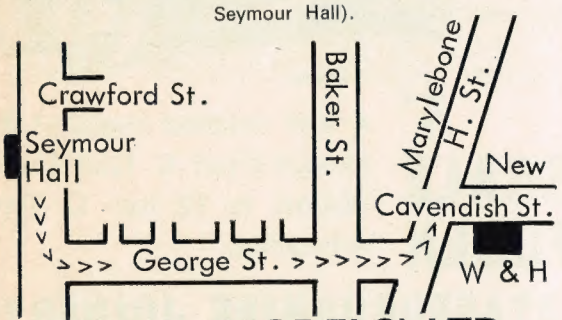

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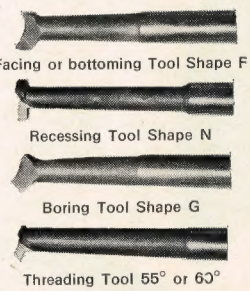

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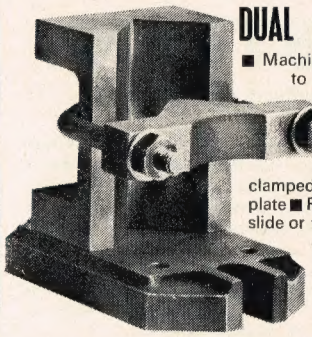

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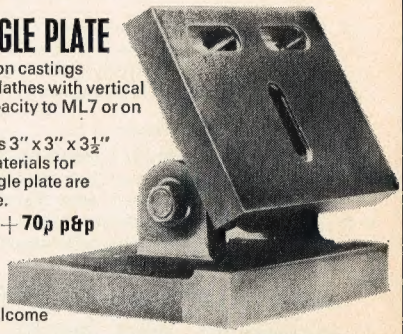

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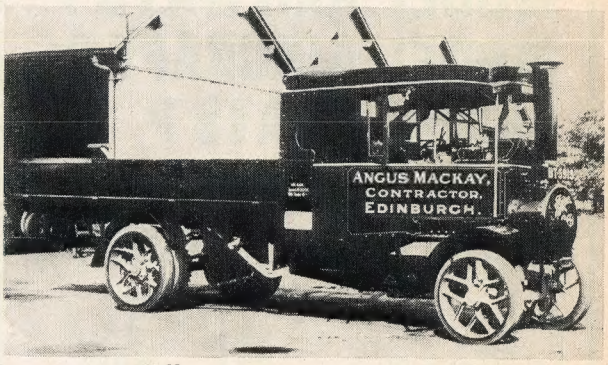

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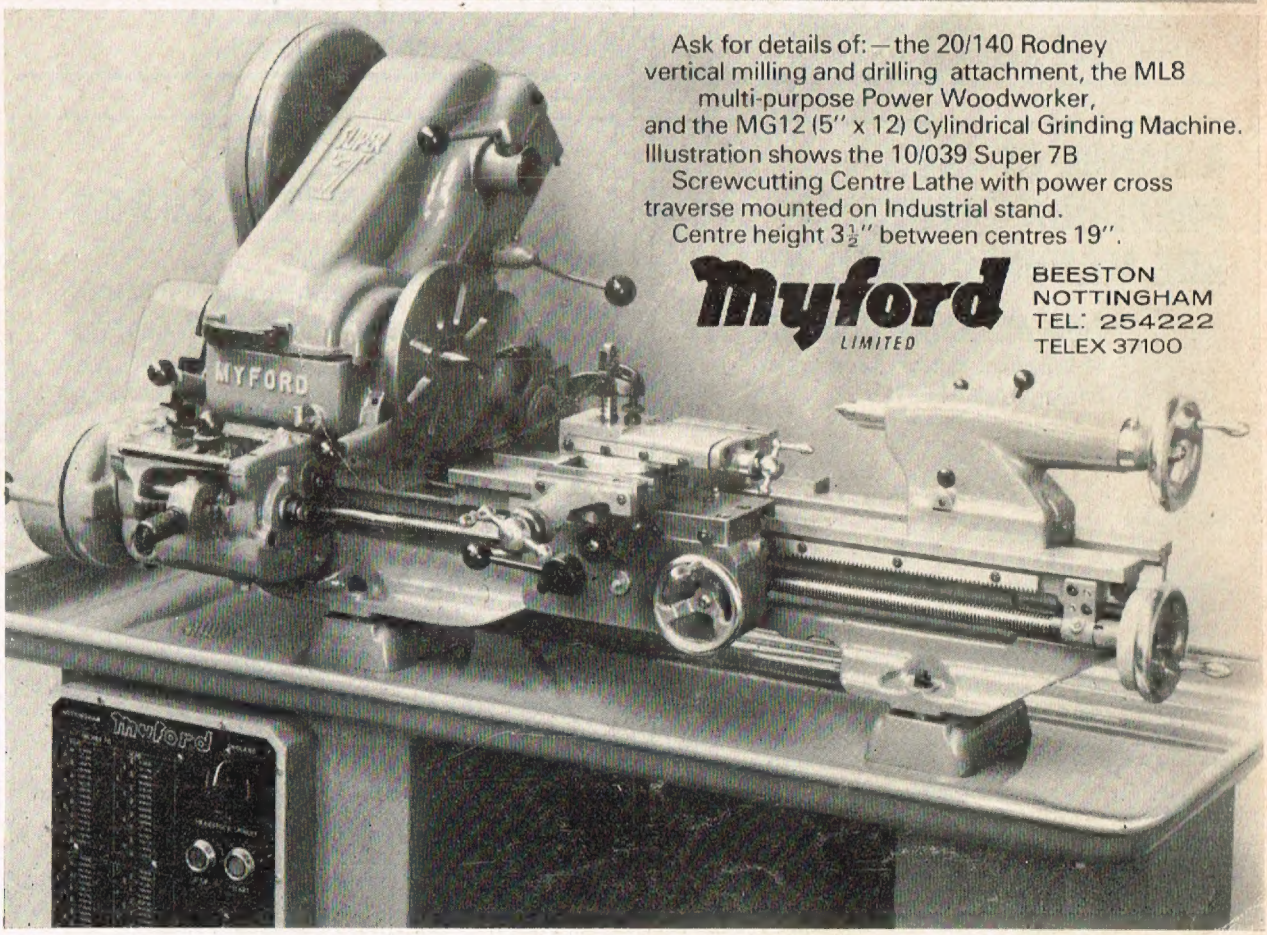

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